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A PLEA FOR INTERNATIONAL UNDERSTANDING

Albert Einstein

I am most grateful to the Foreign Press Association for granting me its Award in appreciation of my modest efforts on behalf of a great cause[1]. My happiness is dimmed, however, by a consciousness of the menacing situation in which human society—shrunk into one community with a common fate—finds itself. Everyone is aware of that situation, but only a few act accordingly. Most people go on living their every-day life; half frightened, half indifferent, they behold the ghostly tragi-comedy that is being performed on the international stage. But on that stage, on which the actors under the flood-lights play their ordained parts, our fate of tomorrow, life or death of the nations, is being decided.

It would be different if the problem were not one of things made by Man himself, such as the atomic bomb. It would be different, for instance, if an epidemic of bubonic plague were threatening the entire world. In such a case conscientious and expert persons would be brought together and they would work out an intelligent plan to combat the plague. After having reached agreement upon the right ways and means, they would submit their plan to the governments. Those would hardly raise serious objections but rather agree speedily on the measures to be taken. They certainly would never think of trying to handle the matter so that their own nation would be spared whereas the next one would be decimated.

But could not our situation be compared to one of a menacing epidemic? People are unable to view this situation in its true light, for their eyes are blinded by passion. General fear and anxiety create hatred and aggressiveness. The adaptation to warlike aims and activities has corrupted the mentality of man; intelligent, objective and humane thinking has hardly any effect and is even persecuted as unpatriotic.

There are, no doubt, in the opposite camps enough people of sound judgment and sense of justice who would be capable and eager to work out together a solution for the factual difficulties. But the efforts of such people are hampered by the fact that it is impossible for them to come together for informal discussions. I am thinking of persons who are accustomed to the objective approach to a problem and who will not be confused by exaggerated nationalism or other passions. This forced separation of the people of both camps is one of the major obstacles to a solution of the burning problem of international security.

As long as contact between the two camps is limited to the official negotiations I can see little prospect of an intelligent agreement, since considerations of national prestige as well as the attempt to talk out of the window for the benefit of the masses make reasonable progress almost impossible. What one party suggests officially is for that reason alone suspected by the other. Also behind all official negotiations stands—though veiled—the threat of naked power. The official method can lead to success only after spade-work of an informal nature has prepared the ground; the conviction that a mutually satisfactory solution can be reached must be gained first; then the actual negotiations can get under way with a fair promise of success.

We scientists believe that what we and our fellow-men do or fail to do within the next few years will determine the fate of our civilization. And we consider it our task to help people realize all that is at stake, and to work, not for appeasement, but for understanding and ultimate agreement between peoples and nations.

It seems to me that the foreign journalists in this country, when they bestowed their Award upon a scientist, must have been led by similar considerations as those which I have expressed here. May they succeed in contributing to the general acceptance of that point of view.

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1. Dr. Einstein's remarks were addressed to the members of the Foreign Press Association to the United Nations on November 11, 1947 in accepting the Association's awards as chairman of the Emergency Committee of Atomic Scientists. The award was given "in recognition of his valiant effort to make the world's nations understand the need of outlawing atomic energy as a means of war, and of developing it as an instrument of peace."

PRESENT STATE OF THE UN NEGOTIATIONS ON ATOMIC ENERGY

Federation of American Scientists

The following memorandum was released by Dr. Robert E. Marshak, Chairman of the FAS on December 9.

Ever since its formation two years ago the Federation of American Scientists has maintained as a high responsibility the dissemination of the facts about atomic energy, with its great possibilities for good and evil. The Federation has underlined the potency of the atomic bomb as a weapon of mass destruction, the temporary character of the American monopoly, and the fact that there is no foreseeable defense which will save the United States from ruin in an atomic war. The Federation has gone further; it has stated with all the power at its command that these facts lead to the conclusion that atomic energy must be controlled by an international agency if an atomic armaments race is to be avoided.

The Federation of American Scientists hoped at first that the novelty and the terrible drama of atomic energy would supply incentive enough for United Nations agreement on international atomic control even though other issues still bitterly divided the world. In atomic agreement, it was felt, the pattern for broader international cooperation would be set. Unfortunately, this hope has failed to materialize; the United Nations Atomic Energy Commission has been unable to escape the fundamental distrust between the United States and Russia.

The Federation of American Scientists now recognizes that the conflict between the United States and Russia over the reconstruction of Europe and Asia and the nature of the peace renders most unlikely the attainment of agreement on a plan for atomic control in the immediate future. Nevertheless, the Federation firmly believes that the work of the UNAEC must continue; it steadfastly opposes all those who insist that no agreement is possible under the circumstances and that the various governments should therefore cease trying to negotiate.

The Federation holds that the problems and controversies of control must be spelled out and that the present negotiations provide an indispensable mechanism for securing final agreement. To assist in the task of arriving at ultimate atomic agreement, the Federation wishes to make several specific recommendations.

First, the Federation recommends a complete investigation of the costs in money, men, and in economic and political implications of atomic control schemes alternative to the majority plan as presented in the second report of the UNAEC to the Security Council. In particular, the UNAEC is urged to examine carefully the Russian proposals of June eleventh and the concept of quotas. The UNAEC will thereby establish whether or not an atomic control plan based upon quotas and inspection can be made effective.

The Federation has long supported the plan which calls for managerial control of installations using dangerous amounts of fissionable material. Its support of this plan is based not only on narrow technical problems of atomic energy but especially on broader arguments of human motivation. Only a detailed study of alternative schemes to the majority plan can be convincing on this and other points.

Second, the Federation recommends further elaboration of the majority control plan. It is apparent that a good deal of sound thinking has gone into the second report of the UNAEC. Development of important aspects of the majority plan which have not yet been adequately considered, such as the organization of the control agency, the distribution of dangerous activities, and the sequence and timing of the transition stages, would therefore be most valuable.

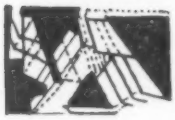
Third, it is now evident that consideration of atomic control cannot be divorced from other disarmament measures. For example, the discussion of the transition stages leading to effective atomic control will, in all likelihood, involve discussion of simultaneous disarmament in the field of conventional weapons of war. The Federation therefore advocates close coordination between the work of the UNAEC and the commissions considering the limitation of conventional armaments and the nature of the armed forces of the United Nations.

Finally, it is clear that the attention and effort applied to the atomic energy negotiations by most nations has not equalled that of the United States. To overcome this obstacle, to increase scientific participation and to arouse public interest in the success of the negotiations, the Federation suggests that the site of the UNAEC discussions be moved around from one nation to another.

The Federation of American Scientists wishes to remind all nations that during World War II enormous sacrifices were made, major shifts of policy were undertaken and given the widest possible support, all because in war there was the everpresent will to win.

What is needed now is the overpowering will to agree, the all-out effort to act, not as if one nation is the enemy of another, but with the realization that all nations are partners in the desperate enterprise of living together. It is not the mechanism of the United Nations which is at fault; in this respect the substitution of any other system would not appreciably alter the situation as long as the will to agree is absent. The Federation will do all that it can, as an organization of scientists, to establish an atmosphere of cooperation and the will to agree.

THE MARSHALL PLAN AND AMERICAN FOREIGN POLICY



Edward S. Mason

Dr. Mason, Dean of the Graduate School of Public Administration at Harvard, discusses the shift in our foreign policy from negotiation, which has proved fruitless, to the positive concept of economic stability envisioned in the Marshall Plan for European Recovery. Dr. Mason presented this paper before the Academy of Political Science on November 12, and it will shortly appear in the Annals of the Academy.

The formulation and implementation of a program of economic assistance to Europe which will lead to economic and political stability there (the so-called Marshall Plan) has become the central task of American foreign policy. The European Recovery Program has thus replaced direct negotiations with the U.S.S.R. as our immediate method in moving toward the stable and peaceful world order which is our goal. An understanding of the significance of this shift is prerequisite to useful participation in the great continuing debate on the achievement of world peace, a debate in which physical scientists are now taking an energetic part.

The character and magnitude of American interests in European economic stabilization quite obviously cannot be discussed without reference to our policy toward Russia. But the relevance of the current foreign aid program to our Russian policy needs to be carefully stated and explicitly understood.

To date we have attempted through negotiations with Russia to work out the basis of a stable postwar world. We have negotiated in the United Nations, in the Council of Foreign Ministers, in the Allied Control Councils in Berlin and Vienna, in the Far Eastern Commission, in Korea and elsewhere. To say that these negotiations have been notably unsuccessful belongs in the department of understatement.

It is highly important, nevertheless, to diagnose correctly the reasons for this failure. Some say that our failure springs from the fact that Russia is obviously bent on world conquest. Others say that Russian actions to date can all be explained by her preoccupation with security. The Soviet Union, according to this explanation, is suffering from an acute case of encirclement phychosis. As far as American policy is concerned, both of these explanations add up to approximately the same thing. An acute preoccupation with defensive action can easily lead to action which is offensive in both senses of the word.

Both of these explanations are, however, in my opinion wrong, or, if not wrong, they are at least customarily stated in a manner that throws little light on appropriate American action. Our policy of negotiation has failed to date for altogether different reasons.

THE REAL REASON FOR FAILURE

Whatever else the Russians lack—or for that matter anyone else trained in the Marxian school—they do not lack a sense of history. In fact they have, ready-made, a "scientific" interpretation of history which is not only equipped to explain the past but to predict the future. This interpretation of history tells them that time is working on their side. And if time is working on their side, why should they yield in negotiation today that which the inevitable course of events will bring them tomorrow?

What has happened in Europe, moreover, in the two and a half years since the end of the war against Germany, lends a certain credence to this view. The Soviet Union has made substantial progress in binding the former German satellite countries plus Poland and Czechoslovakia to the communist axis. Although economic recovery in this area has not been notable and although the recovery that has occurred has redounded largely to Russian benefit, this has not prevented the establishment of strong Russian-dominated governments. In western Europe, communist penetration to date has been less successful. But, if economic recovery in the West which at least in the area of industrial output has been substantial, is now checked, political instability, so obvious in France and Italy is bound to increase.

RUSSIANS MAY FIND THEIR FORECAST FALSE

Looking beyond the borders of Europe one also must take into account the fact that the depression in the United States still remains an imminent possibility in the Russian short-run forecast. And, over a longer period, Marxian ideology, of course, foresees a disintegration of capitalism everywhere. As long as events, in Europe or the world, appear to bear out this vision of the immediate future we may expect to get nowhere in negotiations with the Soviet Union on matters that seriously concern the shape of the postwar world.

Under these circumstances the only effective line of action open to us is to attempt, ourselves, to influence the course of events. To me this is the primary significance of the new approach in American foreign policy. If the Marshall program is successful and the participating countries are firmly established on the road to recovery, we may reasonably expect to see the increasing stability and strength of democratic governments not only in Europe but elsewhere in the world. If and when this happens, we may also reasonably expect to see a change in the Soviet forecast with a subsequent improvement in

the prospect of achieving agreement through the process of negotiation.

After all, this would not be the first time that Soviet truculence based on a faulty forecast has given way to sweet reasonableness once the falseness of the forecast had been demonstrated by the course of events. After World War I the leaders of the Russian Revolution expected revolution elsewhere in the capitalist world. Indeed, since it was widely held that the success of communism in Russia depended upon the success of world revolution, the communists in Germany, Hungary, and other countries were urged by their Soviet brethren to try out the formula. When the formula conspicuously failed, Soviet foreign policy changed 180 degrees. It was decided that communism could be made to succeed in one country after all.

If and when the short-run prospects for communist development west of the Iron Curtain hang fire and falter, the chances of a satisfactory European settlement will improve. There is then no incompatibility between the Marshall program and the continued attempt to reach agreement with the Russians through negotiations. In fact quite the reverse is true. Our best chance of reaching satisfactory agreement is through the success of the foreign aid program.

It is for this reason that to characterize the Marshall program as anti-Russian or as an attempt to bypass the United Nations is particularly absurd. The United Nations will never be able to function as intended until the United States and the Soviet Union have settled by negotiation certain outstanding issues of which the most important are the international control of atomic weapons, and the kind of peace settlement to be imposed on Germany. We shall never be able to settle these issues in a manner at all satisfactory to the United States so long as the Soviet Union foresees a course of events which, for her, makes negotiations unnecessary.

To embark wholeheartedly on the foreign aid program does not mean then that we should cease to negotiate with the Soviet Union. Nor, I think, need we expect that the Soviet Union will break off negotiations unless and until it is sure that the course of events is moving so inexorably in their favor that further negotiations is unnecessary.

If the primary objective of our economic policy in Europe is to bring about a situation in which it will be possible to reach agreement with Russia on the main lines of a peaceful postwar settlement—and I believe this is a fair statement of the objective—it has certain implications, both domestic and foreign, concerning the way the program is conducted.

AID MUST BE A POLITICAL WEAPON

If we hope and expect later to be able to reach agreement with the Soviet Union, we will not attempt to convert the Marshall plan into an anti-Russian program. We will not ask the European countries to take sides for the inevitable war between east and west. We will not undertake measures which amount to the prosecution of economic warfare against Russia. Rather will we attempt to encourage so far as possible the exchange of goods between western and eastern Europe.

In Germany, while taking the steps necessary to the economic recovery of the western zones, we will not close the door to the unification of Germany. We will not bestow approval on western European political parties and governments in proportion to the intensity and volume of their anti-Russian propaganda.

What we *will* do, if the foreign aid program is regarded as a necessary step toward a reasonable settlement among the great powers, is to focus attention upon the *economic* problem of recovery in western Europe. We have the right and the duty to insist on such measures of cooperation from European countries as are clearly necessary to the promotion of economic recovery within the framework of established institutions. We have no right—nor will we be able—to impose conditions affecting the structure or functioning of political and economic institutions in the participating countries.

HYSTERIA AT HOME MUST BE AVOIDED

The domestic implications of the foreign aid program are equally important. If the program is merely a campaign in a so-called "cold war" against Russia, the domestic implications are of one sort; if, on the other hand,—and as I believe—the promotion of recovery in Europe will lend aid and assistance to our attempts to negotiate with Russia, they are of quite a different sort.

The hysterical overtones of some of the writing on Russia in certain sections of the American press certainly suggest the first interpretation of the program. Both this and the overzealous search for communist sympathizers in Washington and elsewhere may be condoned, however, if the European aid program is to be regarded as a lining up of allies for the inevitable struggle. They are hardly to be condoned on any other interpretation.

If the foreign aid program is an attempt to promote European recovery in order to establish the basis for an equitable peace settlement, neither hysteria nor the loss of our civil liberties is called for.

MINIMUM REQUIREMENTS FOR ECONOMIC RECOVERY

Turning now to the character of the United States program in western Europe it must be recognized that, if the course of events is to run contrary to the Soviet prognosis, what is called for is not merely relief but the laying of a solid foundation for economic recovery. Congress has proclaimed the end of "operation rathole." If the Marshall program is to accomplish its purpose, assistance from the United States henceforth must be justified primarily in terms of its contribution to economic recovery. And American assistance, if it is to be effective, must be rendered within an adequate framework of self-help by the European countries and of mutual assistance among these countries.

This is recognized in the Paris report of the sixteen countries which in its statement of principles and in its conception of the problem is an excellent document. When one turns from general principles to the detailed statement of requirements the report, it is true, is something less than adequate. No one who has any inkling of the difficulties of negotiating among sixteen countries a schedule of estimated production, exports and import requirements, projected four years into the future, could have expected otherwise.

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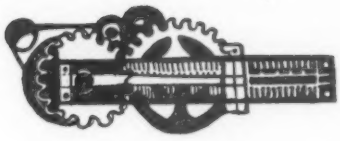
THE FIRST YEAR OF THE ATOMIC ENERGY COMMISSION



Edward Teller

Dr. Teller summarizes the accomplishments of the Atomic Energy Commission during its tenure of office, stressing the work of reorganization and preparation for future progress. Dr. Teller is Professor of Physics and member of the Institute for Nuclear Studies at the University of Chicago, and a consultant to the A. E. C. Laboratories at Argonne and Los Alamos.

Two and a half years have passed since the explosion of the first atomic bomb caught the imagination of the people. Many are asking now—where are the miracles which the atomic age has promised? The power that wiped out the Japanese cities is not yet used to heat houses or to irrigate deserts. Not a single wheel has yet been turned by atomic energy.

There are two reasons for this apparent lack of progress. First, it is easier to destroy than to do useful work. In the time of Queen Elizabeth, the chemical energy of gunpowder was being used in canon, but the warships were not to be driven by the power of combustion for centuries to come. The second reason is that the frantic progress of wartime work cannot be maintained in the years of peace. In the last two and one-half years, only half a billion dollars was spent as against the two billion expended during the war. This reduced rate of activity was unavoidable. We had to stop, look around, set new goals and standards so that we could proceed at a more considered pace.

REORGANIZATION

UNDER THE A. E. C.

This important work of reorganization is the one that the Atomic Energy Commission has accomplished in its year in office. The results are not yet apparent to most people, not even to scientists unless their work is closely connected with the laboratories or development plants of the A.E.C. But the seed has been sown.

In order to appreciate the work done by the A.E.C., we must remember the state of the atomic energy projects when the new administration took over. Immediately after the end of the war most of the key men whose initiative and work created and maintained the atomic projects returned to their university positions. General Groves said, "My first and second team have left, my third and fourth team are leaving." This statement incidentally did not make life any easier for those few patient and conscientious scientists who stayed on their jobs in Oak Ridge, Los Alamos, and other places, because they did not want to allow these laboratories to disintegrate completely.

FORWARD PROGRESS

RESUMED

On the other hand, the scientists who returned to the universities had good enough reasons for their action. During the war basic research and teaching were completely neglected. These are to most of us pleasant and important duties. We know that no progress can be maintained in the long run if fresh ideas and fresh talents are not available. Unhurried work carried out in academic traditions is the basis on which the science of today and the industrial progress of tomorrow is built.

Due to the growth of applied science and to the neglect of scientific education of young men during the war, we are faced with an acute shortage of capable physicists. This shortage will not be relieved for several years although some improvement may take place when those students whose work was interrupted by the war complete their formal training.

Under these conditions it is not surprising that progress at the rate of a decade per year cannot be sustained. Actually, this phenomenal development turned into a retrograde movement during the first months after Hiroshima. What the A.E.C. has accomplished is to put us back on the path of progress and to lay wise plans for the future. The following is a part of the record for 1947[1]:

Careful plans are laid for developing all peaceful uses of nuclear energy including its industrial application. This is necessarily a slow progress as compared to the priority-spare-no-cost procedure of our war effort.

A well equipped laboratory, being organized in Brookhaven, is nearly ready to absorb and utilize scientists when they become available.

At the time the A.E.C. was confirmed, leaders in nuclear physics were deserting the pile research in the Clinton Laboratories. One of the first actions of the Commission was the reorganization of the too rigid set-up in this laboratory. The exodus of scientists stopped.

In Los Alamos the attitude of the scientific team has undergone a particularly remarkable change. The morale in Los Alamos was a at very low level throughout 1946. Most of the workers did not appreciate the great scientific problems connected with further development of the atomic bomb, and the gradual loss of first-class scientists had changed Los Alamos from a uniquely brilliant place

1. Due to the limited experience of the author the account is necessarily incomplete.

into one which was still good but no longer among the best in the country. The departure of every additional leading scientist was a shock to those who remained.

HIGHER MORALE

READILY APPARENT

At the present time a complete change of attitude and morale is visible even to the casual observer. The laboratory sets its own program, which is directed toward a better understanding of this slightly new phenomenon, the atomic bomb. Its staff realizes that any long-range development can be based only on such better understanding. The men in Los Alamos now know what their goals are. They are working with increased enthusiasm and even their number has started to increase.

A year ago it was not easy for a university student to work on his dissertation in the Argonne National Laboratory. Recently such work has been encouraged, helping to provide us with talent for tomorrow. Not only will we have more good physicists, but some of these physicists will acquire with their degrees specific knowledge in nuclear technology. Moreover, such research workers will add to the fund of experience and techniques available in the A.E.C. laboratories.

RELATIONS WITH INDUSTRY

MUST BE WORKED OUT

The greatest problem which faces the Atomic Energy Commission in the coming year is, in my opinion, the relations between the Commision and industry. It would be highly desirable to utilize fully our splendid industrial machines in the atomic projects. This, however, is not easy to accomplish. According to the law and according to the wishes of a great majority of our people, the bulk of atomic information and materials important for further developments must remain under the control of our Government. In fact, both this information and this material is much too dangerous to be allowed to circulate in an uncontrolled manner.

This makes it very difficult for industry to participate in the developments in any other way than as contractor for the United States Government. This type of operation in turn is not in perfect keeping with our traditions of free enterprises. In addition, atomic projects are long-range projects, and in many cases industry will find it difficult to embark upon the necessary long-range plans.

These difficulties cannot be solved by any one sweeping decision. Far-sighted statesmanship, tact, and patience are needed. There is at least one indication that all of these are available. The relations between the Atomic Energy Commission and the General Electric Company seem to be excellent; the atomic laboratory established by the company is flourishing. There is every reason to hope that similar cooperation will be established with other industrial firms.

This record may not be in keeping with the superlatives of "atomic" phraseology, but this seemingly inconspicuous work may become in time the foundation of the second—the atomic—industrial revolution.

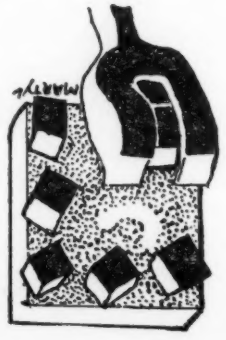
A LETTER FROM EUROPE

[*The following letter was written to Dr. V. F. Weisskopf by Dr. J. M. Burgers, Professor of Aero and Hydrodynamics at the Institute of Technology, Delft, Holland.*]

December 4, 1947

Yesterday's newspaper mentioned that according to a recent communication by Lilienthal the U.S.A. is engaged upon the production of new atomic weapons. Is this true? If not, who would be responsible for such a piece of bad news?

You had asked me some time ago to write about the impressions made upon us European scientists by American developments. For myself I must say that I am thoroughly upset (What should one say "emtrustet"?) by this piece of information, and I think that many scientists in Holland and many other people will feel the same way. I admit, of course, that the Russians have obstructed all attempts at international agreement on atomic energy. Still I had considered their basic condition, that all existing atomic weapons should be destroyed, as a rational one.



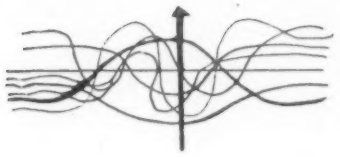
Atomic weapons present such grave dangers to mankind that any state preparing to use them again after the defeat of Japan is menacing our civilization. Now we have accepted more or less the idea that the U.S.A. might preserve already existing bombs. However, the preparation of new weapons of this kind, is outstepping the boundaries of behavior we think indispensable for Democratic communities. You may point to the fact that the Russian government has announced that it is now in possession of atomic power. I do not consider this as sufficient ground for any other state being entitled to do the same.

An announcement such as has been now can only produce new tensions. Moreover, the fact that the decision concerning its use must be concentrated in a very small and special group of people, strengthens all dangers which military organizations of the existing type mean to mankind. It should have been the duty of the American people, or at least of its leaders, to say: we will not let ourselves be overpowered with fear; we value a righteous attitude and respect for civilization above all, and we will not increase our stock of atomic weapons. This might have meant a certain danger for the U.S., but it would have meant a relief to the world. I believe that no efficient steps towards the salvation of civilization can be taken if we are not prepared to accept such risks.

—J. M. BURGERS

A RE-EXAMINATION OF THE McMAHON ACT

Karl Cohen



The Atomic Energy Commission has been in office for more than a year, and it is natural that its activities and the McMahon Act under which it functions should be subjected to careful reappraisal. Elsewhere in this issue Dr. Teller lists the achievements of the A.E.C., and Mr. Pike discusses its program. In this article Dr. Cohen suggests changes in the domestic structure to fit in with altered expectations of international control. During the war Dr. Cohen was director of the theoretical division of the Manhattan Project Laboratory at Columbia, and is now with the Standard Oil Development Company. The opinions expressed represent the personal views of Dr. Cohen.

Recent issues of the Bulletin, featuring articles on foreign policy by Urey, Szilard, Mott and others, testify to a growing realization among scientists that international accord on the basis of the Baruch proposals can no longer be hoped for. Since atomic scientists played so large a part in the formulation of the Acheson-Lilienthal report, and in securing its embodiment as U.S. policy, it is only natural that they should feel a certain responsibility to suggest further measures to meet the new situation.

Up to the present, however, these suggestions have been concerned almost exclusively with foreign policy. There have been no serious discussions of the present status of our domestic atomic energy policy, although its revision is perhaps more urgent than that of our foreign policy. Indeed the general public must be puzzled at the contrast between our uninhibited expressions on foreign affairs (a field in which after all our scientific and academic background confers no special competence) and our unrelieved conformism on matters within our immediate experience, such as the National Laboratories program, the program for atomic power, and so on.

The purpose of the present article is to focus attention on one of these internal atomic energy problems, namely the anomalous position of the McMahon Act. The main virtue of this bill, and the chief argument of its advocates, is that it allows for easy integration into an international control scheme of the Acheson-Lilienthal type.

RECONSIDERATION OF DOMESTIC POLICY NEEDED

One might question whether it was wise in the first place to mold our domestic atomic energy organization to fit an international pattern, which even its most ardent supporters never thought had more than a 5 percent chance of succeeding. Now that this 5 percent has diminished to the vanishing point, it is imperative to reconsider the McMahon Act on its domestic merits alone. Even those who consider the McMahon Act completely satisfactory should welcome such a discussion, for if domestic policy is only the tail of the foreign policy kite, a shift in the international wind could lead to sudden and thus ill-considered changes of internal policy.

For the benefit of those who still believe that the Acheson-Lilienthal plan, or any reasonable modification thereof, may yet win international acceptance, let me review the evidence. It should be superfluous to mention that the raison d'etre of the Acheson-Lilienthal report and the Baruch proposals is to secure agreement on atomic energy with the Russians. The heart of these proposals is to set up an international authority which shall own and manage all important atomic energy installations. But it is now an experimental fact that the Russians refuse categorically to consider the Baruch proposals even as a basis for discussion. To quote Mr. Vishinsky "The Soviet delegation is opposed to such a thesis and will remain opposed to it in the future."[1]

Mr. Vishinsky's reason for rejecting international management is equally explicit.[2] "The Soviet Union cannot count on the benevolent attitude of the majority of the international authority." This places atomic energy where it properly belongs, as a particular case of the central problem of our times: the schism between the Russian socialist police state and the Atlantic capitalist democracies.

To make the point clearer: the Lilienthal plan (and for that matter the world government plan also) supposes the problem of working together with the Russians to be already solved. Mr. Vishinsky at least is aware that it is not, and there is little prospect of solving the problem unless we recognize it too, and face it squarely. What the cure for this cancer of the body politic may be, I do not know, but it is more scientific to admit ignorance and to continue looking for a solution, than to advocate pills, pink, white, or particolored.

SCIENTISTS ARE RELUCTANT TO ADMIT FAILURE

The unpleasant fact that there is no prospect of an accord on the basis of the Acheson-Lilienthal plan was patently obvious a year ago, and indeed might have been predicted from the beginning. It is therefore of some interest to inquire why most of the scientific fraternity behaves like the courtiers in the fairy tale of the emperor who

1. Speech before U.N. General Assembly, *N.Y. Times*, Sept. 19, 1947. The quotation is exact and in context.
2. *Ibid.* This is a paraphrase.

had no clothes on, and contrives to ignore the manifest decision of the Soviet Government.

This attitude has two psychological roots: one is a faith in the fundamental progressiveness of Russia, which therefore cannot fail to end up on the side of the angels; the other is the schematic and oversimplified one-world-or-none reasoning. The one-world reasoning leads disciples to the conclusion that we must achieve world unity or be "automatically" destroyed. As the only alternative to unity by accord is unity by conquest, logic would compel those one-world disciples who abandon hope of an accord to preach a preventive war. But this they will never do, as it is morally unacceptable. And so they cannot admit, no matter what the evidence, that accord is not possible: they are trapped by their own logic.

EMPHASIS STILL ON MILITARY APPLICATION

The second great virtue of the McMahon Act, and the principal one relating to the domestic scene, is that it takes control of atomic energy away from the military and puts it into civilian hands. There were two sorts of arguments advanced against Army control of the atomic energy program: the first was that it meant emphasis on bomb-making and not on peaceful applications; the second related to inefficiencies in Army administration.

The value of the former objection was severely weakened by testimony before the Senate Atomic Energy Committee that the destructive aspects of atomic energy would far outweigh its constructive possibilities for at least two decades. Furthermore the announced policy of the A.E.C., as presented in a speech by Sumner T. Pike[3], is to put prime emphasis on weapons production. Taking control away from the military was also supposed to be a conciliatory gesture which would further the chances of international accord. As we have just seen, this gesture has not been a conspicuous success, and indeed a very considerable body of opinion holds that firmness is a better way of influencing the Russians.

There remains, then, the question of administration. The two principal charges leveled against the Manhattan District were the imposition of arbitrary decisions arrived at without or against the advice of qualified scientific experts, and the carry-over of military security practices, which in the scientific field were over-restrictive and partially self-defeating.

ORGANIZATION IS STILL CENTRALIZED

As Mr. Lilienthal has recognized, it is extremely difficult to form a judgment of a centralized administration operating in secrecy, because one cannot know what is being done or left undone. But I invite each individual scientist to ask himself, whether he or anyone he knows has more or less knowledge about or influence on the administration's over-all program, than under the regime of General Groves. It is clear, at any rate, that the mere change from military to civilian administrators has not magically eliminated any problems. In one respect there has been a decided change for the worse: while the Army tried to appease the scientists, the A.E.C. appears confident of their uncritical support and feels it necessary to appease Congress and the Army.

Of course there are more cogent and principled objections to a planned scientific economy than the personality of the administrators. It is not difficult to see that most of the faults are *inherent in centralized organization itself*: that is why so many features of the Manhattan District disturbing to scientists are being perpetuated by the A.E.C.

From a technical standpoint there are other serious difficulties which have not been fully appreciated. We can best make this clear by an example. Suppose the decision on the Hanford piles had gone the other way, as it very easily could have, and helium had been used for cooling instead of water. A great development program on pumps, gas seals, and finned uranium extrusions would have been carried through, no doubt successfully. The difficult canning problem would never have been tackled, much less solved. The official report would then read that water-cooled piles had been proposed but rejected because of the corrosion problem, and that while many technical uncertainties existed, there was no reason to doubt that the correct choice had been made.

Only a few theoretical physicists (with no knowledge of corrosion) would still believe that water cooling was the better way; and there is no guarantee that they would ever be able to prevail over the enormous head start that gas-cooled pile technology would have had. In other words there is no objective measure of technological success. What is done is always for the best and criticism is unpatriotic, obstructionist and furthermore useless, as there is no place else to go with your ideas.

On a different plane no one is at liberty to push his own pet scheme (good or bad) on his own judgment alone; he must convince a superior official who is inevitably not an expert in that particular field. This puts a premium on good politicians rather than on good scientists. In war time the imperative need for immediate results outweighs such disadvantages, but it is impossible to over-estimate the damage continued centralization can inflict on a new technology, no matter how superhumanly wise the advisors and benevolent the administration.

To sum up, the dissatisfaction of many scientists with the Manhattan District stemmed not from its military, but from its centralized character. The debate on military versus civilian control by-passed the real issue, and the present A.E.C. structure is not substantially different from the Manhattan District in respect to centralization. A final indication of the illusory nature of the scientists' sense of victory about it, is given by the following curious fact: the most vocal and influential representatives of the atomic scientists and defenders of the McMahon Act are totally removed from authority in the national Atomic Energy picture, while at the same time, that group of scientists which supported the May-Johnson bill is prominently in evidence as official advisers.

McMAHON ACT RESTRICTS FREE ENTERPRISE

In addition to the two foremost reasons for supporting the McMahon Act, which we have just considered as they have actually worked out in practice, there are a number of others

3. Sumner T. Pike, *N.Y. Herald Tribune*, Aug. 12, 1947.

relating to the organization of the atomic energy industry. Most of these 'secondary' features of the McMahon Act, were never seriously scrutinized on their own merits, for their principal prop was the Acheson-Lilienthal plan. Yet they involve the most extensive grant of power ever made by Congress and imply a far-reaching alteration in our economic system.

The provisions of the McMahon Act calling for a government monopoly of the development of atomic energy bear a distinct resemblance to current British ideas on socialism. The idea seems to be that free enterprise is a luxury which must be foregone in times of stress or for industries really vital to the country's defense.

This proposition undoubtedly has many adherents among the younger scientists, and it is not my intention to debate it. I would merely like to point out that the American electorate is by no means convinced of the correctness of this doctrine, and I believe they should be more generally informed that the McMahon Act espouses it. Although one of the men influential in framing the bill now maintains[4] such socialization to be one of the virtues of the Act, this argument was conspicuously absent during the Congressional debate.

The argument will probably be raised that the passage of the McMahon Act by a conservative congress is a guarantee of its economic soundness. On the contrary, it rather indicates to what extent the scientists' deliberate campaign of terror was successful in fostering public hysteria and in blocking rational thought.

To be sure, the preamble to the McMahon Act speaks of strengthening free competition in private enterprise, and the public declarations of the Commissioners speak of the need for broad industrial participation. There the matter rests, for beyond the preamble the McMahon Act effectively shuts out all private initiative, and within its strict limits broad industrial participation means inviting selected industrial laboratories to work out pieces of a master development plan established by the Commission.

As the Act now stands, it is very explicit about what private individuals may *not* do, and exceedingly vague about what they may do.

The possibility of commercial exploitation of atomic power for nonmilitary use still depends upon a future evaluation by the Commission "of the social, political, economic and international effects of such use", plus 90 days' time for lobbyists to induce Congress to prevent it.[5] Even supposing a willingness to gamble on a favorable future decision, the patent provisions are such that a firm which spends time and effort developing a new process has no advantage over a competitor who comes in after all the work is done. Under the circumstances it is hardly surprising that all the money invested in Atomic Energy development will be the taxpayers'.

Another provision of the McMahon Act which elicited some support from scientists, is one which directs the Commission to refuse licenses which it believes might foster the growth of monopoly. Presumably the authors of this clause feared that the McMahon Act was opening the field of atomic energy to the wildest exploitation! Actually industry is extremely reluctant to become involved except insofar as the national defense is directly concerned, and *de facto* monopolies are being perforce established by the A.E.C. itself because there are so few seekers.

OBJECTIVES OF REVISION

Before closing a few suggestions on what I believe to be the correct line of action are in order. In the field of domestic affairs, my main argument has been that the McMahon Act is based on false premises, that it is unduly restrictive of individual initiative, and that in practice it is showing the faults of its principles.

Therefore I believe that the Act should be revised with these objectives in mind: (1) The domestic atomic energy organization should be made viable independently of the course of international events; (2) legitimate government and military objectives should be retained; (3) broad participation of industry *on its own initiative* should be secured; and (4) changes should involve the least possible dislocation of the present Atomic Energy program.

The aims (2) and (3) are by no means contradictory: The necessary strict controls on materials and knowledge can be enforced by ordinary legal procedures without government monopoly or government ownership. I do not for an instant believe that there exists in this country a university or sizeable industrial enterprise which would violate the letter or the spirit of any law regarding the inventory and safe handling of fissionable elements, or the dissemination of technical information.

The argument that private enterprise must be excluded because of its occasional international character is specious: Such situations can be easily met by export controls and intelligent security regulations. It is worth noting at this point that control of atomic energy *without* government ownership and management can succeed in the United States because there is an established and universally respected central government. In fact such a plan is far more practical than to attempt control on an international scale, even *with* a monopoly of ownership and management, in the absence of a strong world government.

The specific changes which I would recommend in the McMahon Act, taking account of the objectives just listed, follow. The provisions which establish the A.E.C. and authorize it to engage in mining, engineering, production, research, and military application, insofar as these do not exclude such activities by others, should be retained. This will allow the present program to proceed without interruption.

LICENSING OF RAW MATERIALS AND PLANTS

The provisions requiring government ownership of raw material, fissionable materials, and production plants should be replaced by others requiring A.E.C. licensing and strict accountability, but permitting private ownership. The present government properties would in my mind be retained by the A.E.C. for the time being. The unresolved question of the commercial utilization of atomic energy (Sec. 7) should be determined immediately, and favorably. There is now ample technical evidence that

4. James R. Newman, "America's Most Radical Law," *Harper's*, May, 1947.

5. McMahon Act, Public Law 585, pg. 11, provides "No license for any manufacture, production, export or use shall be issued by the Commission . . . . . until after (1) a report with respect to such manufacture, production, export, or use has been filed with the Congress; and (2) a period of ninety days in which the Congress was in session has elapsed after the report has been so filed."

no untoward dislocation of our existing economy will result.

It is not generally realized that under present laws (excluding the McMahon Act) the government already has the right to use any materials covered by patents[6]. Therefore it is difficult to see what additional advantage accrues to the government in the provisions of the McMahon Act which refuse patents on manufacturing processes for the production of fissionable materials.

The remote possibility that advance in the field may be held up through refusal of the patent owner to license at reasonable royalty to a third party could be overcome through a provision for compulsory licensing of patents of broad application. Thus I recommend that the provisions of Sec. 11 dealing with government seizure of patents be eliminated. This would restore incentive to private research without taking any essential rights from the government.

The foregoing suggestions do not exhaust the possibilities of improvement, but they are things that can be done immediately without radical reorganization. At the same time I believe they are sufficient to eliminate some of the most fundamental defects of the Atomic Energy Act.

There is no cause for fear that government control will no be adequate. In addition to its direct control by licensing provisions, the government will have powerful indirect control through its administration of the security and clearance procedures, through its present monopoly of the production of fissionable materials, and through its orders for atomic weapons.

The above program, although it seems at first glance to concern industry only, will permit independent atomic energy research, and thus effectively remedy the present overcentralization and change the climate in the research laboratories. By putting atomic energy development on a sound economic basis it will be possible for universities to finance part of nuclear research privately, thus ending the threat to our traditional pattern of education which exclusive government support entails.

We may as well reconcile ourselves to the idea that the unsettled state of international relationships will last for a number of years. We cannot indefinitely hold in check our own atomic energy development in the hope of an international accord which will very likely never be reached.

Opening the field of atomic energy to American industry is not an aggressive step. On the contrary, it focusses attention on the peaceful applications of atomic power. At the same time the history of the last two wars shows that deep industrial participation is essential to the national defense.

[6] The owner of the patent has the right to a reasonable royalty which may be determined by the courts.

The Marshall Plan

(Continued from Page 4)

There is little doubt that a number of stated requirements will have to be scaled down either because of lack of availabilities in the United States or because of overambitious planning of the rate of industrial development and mechanization in Europe. But it is well to recognize that in other respects the Paris report probably understates European requirements. The estimates of needed imports are frequently based on over-optimistic expectations of rates of local production. This seems particularly true in the case of coal and is probably true for a number of other industrial areas.

When one type of error is set off against the other, it seems doubtful whether the Paris report represents a serious overstatement of probable European requirements. Recognizing fully the difficulties of such a forecast it would still be my opinion that the order of magnitude of European requirements stated in the report is roughly what will be required to set western Europe on its feet again.

While it is important to keep this order of magnitude in mind, it has little to do with the immediate problem. Congressional appropriations will no doubt be made on the customary yearly basis and there will be opportunity to review the operations of the program at a number of stages. What must be emphasized, however, is that unless appropriations for year one are made with the program for years two, three and four in mind; unless, in other words, it is recognized that all parts of the program are interrelated and focused on a definite recovery objective, there is nothing to prevent this becoming another "operation rathole."

Congress has served notice that it is through with emergency appropriations and stop-gap aid. Is Congress ready to recognize the implications of an integrated foreign aid program carried through consistently to its final objectives? The answer to that question will be given not only in the halls of Congress but in the debate on foreign policy which should, and probably will, over the next few months, be carried to every village and hamlet in the United States.

WE MUST NOT EXPECT GRATITUDE

One final remark on the new approach to United States foreign policy seems in order. Let us not expect too much from this program in the way of popular approbation abroad. Even if all the European requirements stated in the Paris report were supplied without question by the United States, I doubt whether we should be regarded as a generous big brother. The figure of Lady Bountiful is not an endearing one in literature. And when the position of Lady Bountiful is taken by a country which has half the world's industrial output and enjoys a standard of living unmatched elsewhere, it is too much to expect that she shall be voted the most popular member of the class. The one most likely to succeed, perhaps, but not the most popular.

European requirements, in fact, will not be supplied without question. And we shall find it necessary, if European recovery is to be effectively promoted, to lay down conditions which will be felt to be extremely onerous. Recriminations on both sides will, therefore, be inevitable. If our objectives are attained, however, and western Europe once more stands on its own feet with governments both democratic and stable, that will be enough. We should not ask for more.

ATOMIC CONTROLS: THE DOMESTIC DILEMMA

Richard Dyer McCann

Approaching the problem of domestic controls as a student of government Mr. McCann reaches somewhat different conclusions than those presented by Dr. Cohen elsewhere in this issue. He points out the wide latitude between "regulation" and "operation" offered the Commission under the McMahon Act, and suggests some of the factors that will influence eventual policies. Mr. McCann, who is a teaching fellow and tutor in the Department of Government at Harvard, made this study for a seminar in Government Administration and Public Policy.

Like most other administrative commissions of the United States Government, the Atomic Energy Commission is confronted with problems of policy. These problems involve political pressures and economic Philosophy.

The issues are broad. On the international stage, atomic energy has become involved almost inextricably with the veto question and the whole concept of balance of power. It is not surprising, then, that domestically atomic energy is bound to become a focal point for conflicting concepts of economic life.

The Atomic Energy Act of 1946 was preceded by a phenomenal amount of hard thinking. It is a remarkable document. Marked by compromises, it nevertheless grapples gamely with overwhelming problems. We have never before prohibited the possession of a specific mineral without a national license. We have never before prohibited manufacture of a certain product outside of government-owned plants. We have never before required permission from a national Commission in order to distribute power. In an era of many sizable innovations, these are not minor ones.

HOW "SOCIALISTIC" IS THE McMAHON ACT?

But it is misleading to talk of a statutory revolution in our way of life. It seems to be fashionable to say that the Atomic Energy Commission is the most powerful and the most "socialistic" agency in our history. It is true that the Commission must handle the most powerful form of energy man has ever known. It is true that the Commission must own all production plants, though this is hardly startling in a world which includes locally-owned utilities, state universities, a multistate New York Port Authority, U.S. arsenals and navy yards and post office buildings, and the TVA.

It is more significantly true that the Commission has wide discretion to make operating policy decisions within the authority of the act. But it is also true that these decisions are not likely to move much beyond the American climate of opinion on the subject of private enterprise.

Old habits of thought die hard. Public opinion, nationally and internationally, is not finding it easy, as yet, to accept the notion that atomic power is new enough to receive treatment—perhaps even revolutionary enough to receive revolutionary treatment.

"Regulation," however difficult it may be in practice, is probably the theory of atomic energy production most clearly favored by Congress, because it is more familiar than government operation. That "simple" regulation has many immediate conveniences is obvious. That it may offer long-term practicability may be questioned, especially in view of the clear decisions reached by the Acheson-Lilienthal committee and the American delegation to the United Nations Atomic Energy Commission.

Government operation is only partly envisaged in the Atomic Energy Act of 1946. The "Declaration of Policy" in the Act calls for "strengthening free competition in private enterprise" as well as a number of other objectives like increasing the standard of living, promoting world peace, and so on. The accompanying committee report stated that "wherever possible, the Committee endeavors to reconcile Government monopoly of fissionable material with our traditional free-enterprise system."

Some observers say that under Republican tutelage, atomic energy will be completely "returned" to private enterprise. Remembering that promise and performance often vary in the face of facts, the average citizen can only wait and see. The Atomic Energy Commission cannot wait. These five men must move ahead and make decisions, and there are already enough elastic provisions in the basic law to present them immediately with many hard alternatives. They cannot escape history—or politics—or economic philosophy.

OWNERSHIP IS REQUIRED: OPERATION IS OPTIONAL

It may safely be assumed that atomic energy for peaceful purposes is going to be produced at some time in some way. Its scientific practicability seems well established. Its economic practicability is already accepted for isolated areas where other forms of power are not readily available. It may not be many years before atomic power will successfully compete in other areas.

The Commission has on hand at the present time three main facilities for producing fissionable material. At the Clinton Engineer Works in Oak Ridge, Tennessee, there are two enormous plants, producing U-235 in two different ways—one by gaseous diffusion, another by electro-magnetic separation. At the Hanford Works in Washington is the plutonium producing plant. Each had its own unprecedented problems which was worked out in accordance with scientists' discoveries by the engineers of

private firms; each has succeeded in the job assigned. These three operations represent the main effort in the race to make an atomic bomb. During the war, operating responsibilities were given, respectively, to the Carbide and Carbon Chemicals Corporation (a subsidiary of Union Carbide and Carbon), to the Tennessee Eastman Company, and to Du Pont de Nemours and Company.

These facilities for the production of fissionable material must be owned by the Commission, as agent of the United States Government. This the Act makes clear. There are only two exceptions—research and development activities and such low-quantity facilities as would not produce a sufficient amount for a bomb.

But operation of these Commission-owned plants is another matter. And here is the strategic problem of production policy: "The Commission is authorized and directed," says Section 4c, "to produce or to provide for the production of fissionable material in its own facilities. To the extent deemed necessary, the Commission is authorized to make, or to continue in effect, contracts with persons obligating them to produce fissonable material in facilities owned by the Commission."

There are a number of detailed requirements in the case of persons under contract. They must make reports as required, submit to "frequent inspection," and comply with safety and security regulations. Manufacturers of the facilities themselves must have licenses. What a "facility" is, and when one is being actually manufactured—this is one of many ticklish questions left to the Commission to answer. Contractors also must not sub-contract without Commission authority—a noteworthy restriction. In the construction phase of the electromagnetic plant and the town of Oak Ridge, Stone and Webster Engineering Corporation set up more than 40,000 sub-contracts.

REGULATION VERSUS OPERATION

But over and above such specific difficulties as these looms the characteristic dilemma of the Commission—regulation versus operation.

The Senate Committee itself retreated from the original draft of the McMahon bill. Hear these ringing words from the tentative S.1717: "Not more than one year after the effective date of this Act, the Commission shall arrange for the exclusive operation of facilities employed in the manufacture of fissionable materials by employees of the Commission....Except for research installations the Commission shall be exclusive producer of fissionable materials."

It is a far cry from this bold statement of government operation to the present permissive phrase, "to the extent deemed necessary." The Commission is left to decide.

Perhaps an act which read like the original draft would have been amended in any case. Perhaps it will be amended further. And this may be one of the dangers of the indefinite future—that casual application of *laissez-faire* dogmatism to this new and complex thing may thoughtlessly turn the whole thing over to private exploitation. After the long investigation by the McMahon Committee, this seems likely to happen soon only if the Commission makes a notable series of missteps.

FACTORS THAT MAY DECIDE

As it stands now, the Commission bears the onus of deciding the role of private enterprise. And that decision will have to be made in accordance with the prevailing pressures of the day.

A number of strategic considerations will probably influence the Commission's attitude. One obvious and persuasive factor is the contractual *status quo* left in the wake of the Manhattan Project. Another is the fact that power over policy to a very large extent still lies in the hands of Congress—and the permanent Joint Atomic Energy Committee set up by the Act. Congressional relations—Republican relations—are necessarily a primary factor in Commission decisions. That factor pulls them in a conservative direction. It pulls them toward less government operation, inspection, and responsibility—toward more dependence on private contracting and private responsibility.

On the other hand, any attempt to plan activities in line with the Acheson-Lilienthal report on international controls pulls the Commission in the opposite direction—toward more government operation. "Operations like those at Hanford and Oak Ridge and their extensions and improvements would be owned and conducted by the Atomic Development Authority," says the Acheson report.

Here the Baruch recommendations to the United Nations Atomic Energy Commission are fully in accord, calling for "complete managerial control of the production of fissionable materials."

In which direction should the United States Commission turn?

PATTERN FOR THE FUTURE

It need hardly be said that the arrival on the scene of a higher regulatory agency—a United Nations Atomic Development Authority—would introduce administrative relationships of the most complex order. The hierarchy of responsibility—private firm to national government, national government to United Nations—would involve an extraordinary pattern of conflicting loyalties, nationalistic and economic. If private operation should later be replaced by ADA operation—as the Acheson report proposed—every understanding with a private firm which has by that time hardened into a procedure must be broken down and ADA personnel take over.

There is considerable reason to believe, of course, that the pattern of the future may hew to the line of complexity. Atomic treaties—if any, and with or without Russia—may tend to freeze the triplex hierarchy of responsibility and conflicting loyalties. Negotiations in the Atomic Energy Commission have taken into full consideration the possibility of greater leeway for national production, experiment, and use. If ADA operation of plants is not provided in the final treaty, private firms may well continue to benefit in this country. From then on they will have a continuing vested interest in all measures of international control.

To put this concretely: General Electric now has responsibility for a huge new research laboratory at Schenectady and has taken over from DuPont the Hanford works in Washington—by far the most important of the three production plants. Thus

General Electric becomes the primary wholesaler of atomic power. Can it be doubted that General Electric expects to have things to say about the placement of secondary power plants in the United States? Can it be doubted, therefore, that the decisions about production policy of the United Nations Atomic Energy Commission —and of any future ADA—are of considerable importance to General Electric? May it not be assumed that we are witnessing the conscious or unconscious growth of new, top-level lobbying interests, economic in character, international in scope?

"Private enterprise" in atomic weapons has an ominous sound—so much so that there has been no thought of terminating the government monopoly at the Los Alamos bomb factory. But are we to suppress all suspicion of private enterprise in the production of fissionable material? Are we to assume without question that the electric utility interest is going to be the best representative of the national interest?

If we remember the dictum of the Acheson report that only a group really participating in production can effectively inspect and control, we may find this complex interlocking of separate national and corporate interests a barrier to effective controls. If we remember the fact that policy is often made at almost every echelon, we may wonder about the orientation of second-string men who take orders from the company.

If we remember Teapot Dome, we may well have fears about the wise use of this new natural resource by private contractors in the more subtle mid-century. If we remember the close affinity which sometimes grows up between government regulatory agencies and private monopoly groups, we may have strong misgivings as to th elong-term outcome of a situation oddly publicized as "socialistic."

It is unfortunate that critical decisions must be made before we have come to any nationally clear conviction about controls on power production. It is true that we have been—significantly—much more prompt in dealing with this problem than was the case with water power, for instance, which had to wait 20 years for serious recognition as a conservation problem and 50 years for effective national controls.

But as far as policy is concerned, most Americans are not yet sure whether the private utilities or the regulatory Federal Power Commission or the Government-operated Tennessee Valley Authority offer the best approach to the domestic problem. Each of these philosophies will continue to pull and tug on the coattails of the United States Atomic Energy Commission.

A year from now, the Commission may actually have to make decisions about sub-allotting atomic power. The decisions they make this year about General Electric may seriously affect next year's alternatives.

Should these five men make every effort to incline to the wishes of Congressional committeemen—expressed or unexpressed—especially Republicans in the House who threatened to make vital changes in the Act even while they were in the minority? Or should these five men consider themselves as holding an administrative trust, calling for independent judgment—judgment which may incline them toward the most rigid kind of government operation?

The first Commission term is for two years only. Nominations and confirmations must take place again in the fall of 1948. Will the consciousness of this fact cause these men to walk softly, carrying no big stick at all, hoping to accomplish more at some later time? Or will they disregard political factors, remembering chiefly the crucial importance of what precedents they may be able to set in this Year Three of the atomic age?

Obviously they are not going to disregard political factors. Their decisions will have to follow an irregular line of constant compromise.

If there were any possibility at all of world acceptance of an Atomic Development Authority—even on a limited basis, even including a few nations only—it would seem to be sound administration as well as far-seeing atomic policy to prepare for that through early government operation of all production facilities. But the Commission will undoubtedly be compelled by its local political circumstances to move in a much different direction.

The point that is bound to become clear, in the long run, is that "simple regulation" will not be enough. For the atom, there can be no such thing as freedom. The most vexing kind of watchful direction on the part of the public's stewards will have to be the rule. It is often possible for private operation to be a real trusteeship in the public interest. The Commission itself cannot afford to make generous assumptions.

During the critical years ahead, the push-and-pull of interests will exert strange pressures on both Commission and public. "Regulation versus operation" will come to be more than a phrase. It will be a complex problem of administrative policy—complex enough on the basis of the statute, but baffling in the extreme in the face of conflicting economic theories, political facts, and international tensions.

It will be only fair to the Commission for us to refrain from miscellaneous cries of "socialism!" It will be only fair for us to remember that this business of atomic power is different. It is, as Vannevar Bush has said, "the most dangerous manufacturing process in which men have ever engaged."

STABLE ISOTOPES RELEASED BY A. E. C.

The United States Atomic Energy Commission announced on December 6 the availability of over 100 stable isotopes of 29 elements for distribution to research laboratories in the United States.

Distribution of stable isotopes will speed exploration of the structure of the atomic nuclei and will bring new peacetime benefits in the following fields of investigation:

(1) As tracers in medical and biological studies where radioisotopes cannot be used due to the harmful effect of radiation on living tissue.

(2) As tracers in medical, biological, and agricultural studies where the radioisotope is not suitable due to its short half-life.

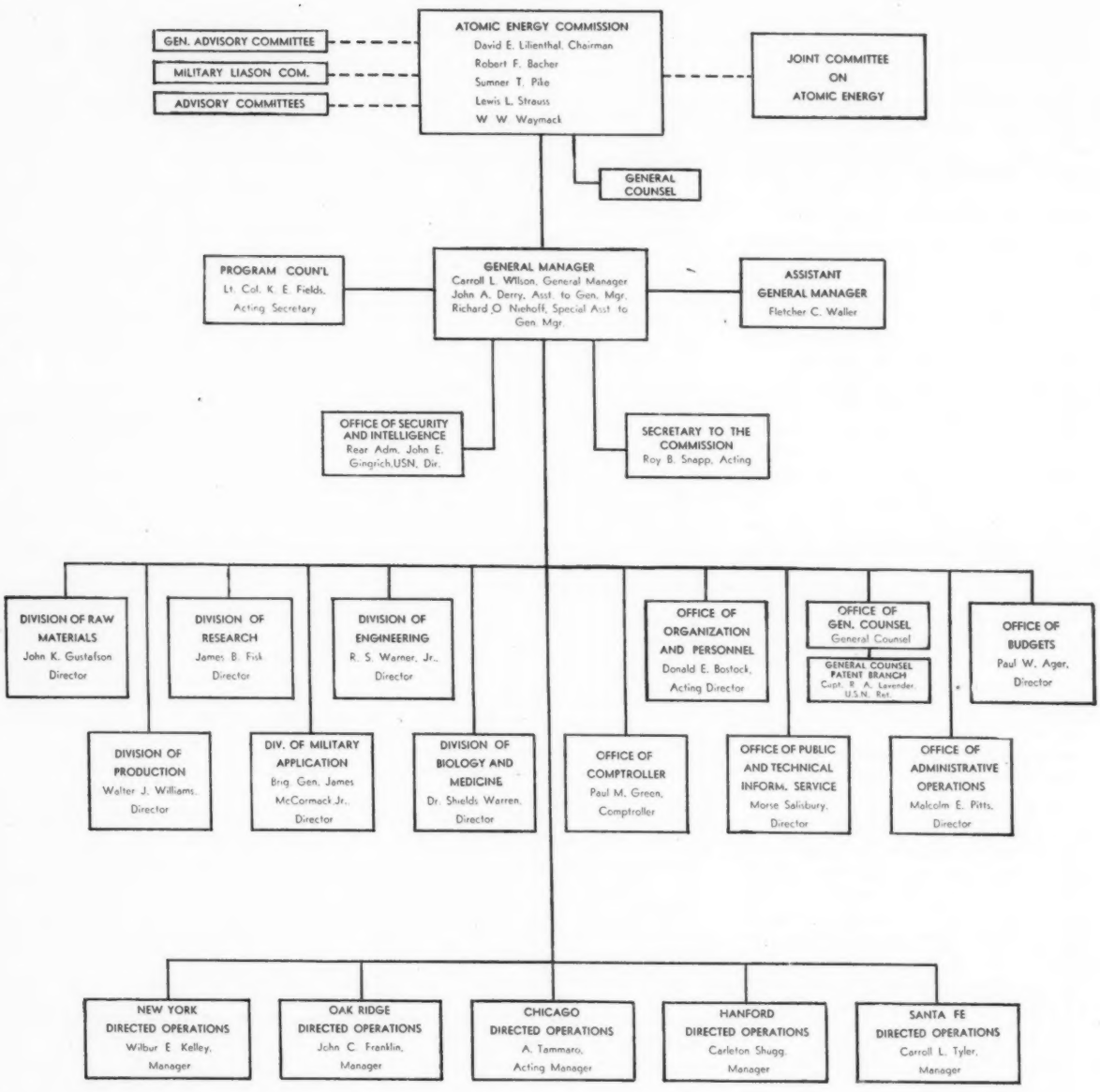
(3) As the starting material for the production of particular radioisotopes which cannot be easily separated.

(4) In spectroscopic studies of individual isotopes.

(5) In investigations of nuclear moments and nuclear transformations induced by bombardment with various particles.

The stable isotopes are available as a result of research and development activities at the Oak Ridge electromagnetic plant, the first to achieve mass production of U-235 early in 1944 for later use in the atomic bomb. The stable isotopes, however, are by-products of research and have no direct connection with atomic bomb development.

U.S. ATOMIC ENERGY COMMISSION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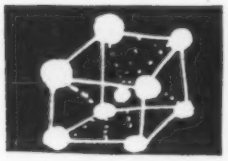
A COMMISSIONER SPEAKS



Sumner T. Pike

Interpreting their mandate to include an educational campaign commensurate with the potentialities of atomic energy the members of the Atomic Energy Commission have spoken to professional and business audiences all over the country. The BULLETIN presents portions of two speeches delivered by Mr. Pike in Pittsburgh on November 20: One before the Pittsburgh Chamber of Commerce and the other at a meeting of the Industrial Hygiene Foundation of America. A third excerpt is from an article on witch hunting and loyalty from the November issue of the ATLANTIC MONTHLY, and is reprinted with the courteous permission of its editors.

We have a large, wide-spread manufacturing organization with well over two billion dollars of invested capital and several hundred million dollars of annual expenditure. The elements of this organization are familiar ones.

First is the raw material and purchasing group with offices in New York. Its main function is to gather the various raw materials and component parts needed for later manufacture. A good many of these things can be and are picked up on the market. Others represent special gadgets and are manufactured for us under specifications and frequently under time contracts.

The principal raw material, as you well know, is uranium ore and since the requirements for later manufacture involve the extremest form of purity, the ore has to go through several stages of treatment. Several well known chemical corporations do this for us under contract.

PLANTS AT OAK RIDGE AND HANFORD

Next in line are two plants which are in a sense parallel operations since each manufactures material suitable for a bomb, but which are different enough to require separate treatment.

The manufacturing operations at Oak Ridge managed for us by the Carbide and Carbon Chemicals Corporation under contract are devoted mainly to separating the fissionable isotope U235 from the U238 which makes up 99.3% of the natural uranium. The methods used here are described in the Smyth Report issued in August 1945; the one which is our principal reliance at present is the method of gaseous diffusion.

These manufacturing operations of enormous size were put into operation hastily without the usual careful testing of pilot plants. Therefore they were susceptible of improvement and one of our big jobs at Oak Ridge is continually to look for engineering and process improvements which will result in more and better production at less cost.

Oak Ridge is a company town with about 35,000 inhabitants where the Commission through contract with a subsidiary of the Turner Construction Company operates the whole works from A to Z. It is landlord, doctor, school master, water commissioner, road builder and mayor. Oak Ridge has to be, and is, a good company town. A great deal of the original hasty and temporary construction work is now being replaced.

In time of peace, the scientists and highly qualified technicians whom we need will not live permanently and bring up their families in a community unless its facilities, including schools and hospitals, are the equivalent of those in the communities where they would normally live, such as university towns or normal cities of considerable size. In those states, and I am sorry to say that Tennessee is one of them, which do not have school and hospital facilities up to the best national standards, we must and do, live up to the higher standards.

In the matter of hospitals, it is obvious that in dealing with a subject matter that is so little understood and that is held in so much awe as atomic energy, we must maintain the highest health standards and must take no chances with the welfare of the people who live and work in the community.

Our other manufacturing city for bomb material is at Hanford, Washington, on the Columbia River. Here is an operation managed for us by the General Electric Company—a plutonium factory. Rods of natural uranium are piled up something like the old fashioned wood pile;—indeed, I believe that is how the name "pile" got to be associated with this operation,—but separated by considerable thicknesses of very pure graphite.

During the operation, a terrific amount of radioactivity is built up in the pile, the equivalent let's say of around a million tons of radium, which when you figure that only two or three pounds of radium have ever been extracted up to date, means a lot of radiation.

In order to extract and purify the plutonium it is necessary to go through an intricate chemical process using remote control devices so that no person is exposed to harmful radiations. Naturally the pile itself is shielded by many feet of concrete and other substances so that the area around it is livable.

A sizeable portion of our total effort is put into checking the hazards to human beings, to make sure that no one of our employees shall ever be exposed to dangerous radiations or if by accident such should happen, to develop and apply curative methods to minimize the risk. These methods are being standardized so that when institutions and industry, either for research or process operations, require the use of radioactive substances, information as to the hazards and methods of protecting them against them will be available to them.

END POINT AT LOS ALAMOS

The end point of our manufacturing operations takes place at Los Alamos, New Mexico where the U235 from Oak Ridge, the plutonium from Han-

ford, and other necessary components are brought together to make a finished bomb. The operations here conducted for us under contract by the University of California are necessarily of the highest degree of secrecy.

The company town of about 8,000 people is located in the mountains about 40 miles from Santa Fe, and here the operation of a properly run town is not only more difficult but is more essential than in the other areas. At this point besides manufacturing we do research and experimentation of the highest order of difficulty in order to improve our product.

ATOMIC INDUSTRY AND INDUSTRIAL MANAGEMENT

Things going on in atomic development are of direct interest to a large number of companies and will be of interest to a great many more. In talking about the subject we have to accept the present rules, whereby certain areas are classified as Secret. However, most of the secret material involves components of the bomb or the processes of separating the U235 or manufacturing plutonium. This work comes under the so-called dangerous areas and would almost surely have to be kept as a Government or international monopoly.

For convenience I am making a tentative classification of companies in order of the closeness of their present relationships to atomic energy work.

COMPANIES UNDER CONTRACT

In the first group we have those organizations which have direct contractual relations with the Commission. Such companies include General Electric, Carbide and Carbon Chemicals, Monsanto Chemical, The Kellex Corporation, Standard Oil Development Company of New Jersey and two or three hundred others.

The managements of these companies have already exerted themselves to find out what was going on in the fields of atomic energy, and of course, in the performance of their contracts most of them have been sorry at times that they were contractors for the Commission. Dependable budgets are almost impossible to make up. New situations occur almost daily which require a modification of emphasis on different projects. Naturally there must be such a close relationship between their management and the work they do for the Commission that there is little danger of their being long unaware of what is going on in the field.

In the meantime these companies are accumulating industrial know-how which should be of great value when and as commercial applications show up. It may also be noted that in the case of contractors and other companies in the same branch of industry, practical development work, which is frequently one of the heaviest costs of industrial laboratories, particularly when results are difficult and impossible to get, is being done completely at Government expense.

COMPANIES DOING RELATED WORK

In the second group of companies, I would be inclined to put the ones involved in the same general lines of work as those in the first group but which are not actually under contract with the Commission, and also those which manufacture devices and equipment which have a direct outlet into the atomic energy field, such as Geiger counters, special pumps, and other items which need not be detailed.

Usually the management in this group is acutely aware of what is going on in at least portions of the atomic energy field and is anxious to expand its knowledge and to keep direct contact with developments insofar as possible. Most of these companies know that we have considerable industrial groups at Oak Ridge and will have others at the Knolls Laboratory at Schenectady, where key men from their organization can learn what is going on and what is being thought about, so that they won't be left behind the procession when and if developments occur which will be of commercial interest to them.

It seems to me that if I were in this group and did not have one or more technicians who were pretty well abreast of what was happening in my area of interest, I should be making attempts to get men placed so that they would be able to tell me what goes on and advise me what I should be doing about such developments.

In the third group I should place those companies which face research and development problems which can be helped by the recently available radioactive isotopes. All through the fields of chemistry, biology and metallurgy it seems apparent that the use of radioactive tracer elements may be able to give quicker and more accurate answers than previously known techniques. Outstanding at the moment is work being done on metal bearings and lubricants and in the field of oil refining.

These radioisotopes are usually made at Oak Ridge and are furnished either as the element itself or in one or two simple compounds. For instance I believe that the isotope carbon 14 is available either as carbon dioxide or methane. It seems probable that companies may very well want to put them into other chemical combinations. People who first learn the trick of making the radioactive combinations might well develop a profitable little business in their sale to other companies who either can't or don't want to go to the same trouble. This would apply particularly to such common elements as carbon, sulphur, phosphorous and iron.

The people in this group quite obviously, and in the other groups to a lesser extent, must get some knowledge of dangers to health involved in the use of radioactive isotopes. This will naturally develop such measures as are necessary to protect the personnel involved in the use of these isotopes.

COMPANIES BENEFITING BY RESEARCH RESULTS

In the fourth group I am placing companies which will have uses for the things which are developed as the result of research in the atomic energy field. For instance, it is going to be necessary to do a great deal of work in high temperature and high pressure metallurgy before we can expect useable commercial power from the nuclear reactors.

It seems to me that if I were in, let's say in the pump and valve business, I should want to be among the first to know and utilize the material results which will almost surely come from the necessary research activities of the Commission and its contracting firms.

Another development which will be of great interest to industry is that of fluorocarbons and fluorine.

Prior to the war little was known and little use made of fluorine products. The gaseous diffusion process for the separation of isotopes of uranium employed a gaseous fluoride of uranium and it became very necessary to investigate the field of fluorine compounds. As a result of this wartime research, compounds are now used in such diverse industrial processes as refrigeration, synthesis of hi-octane gasoline, insecticides, dyes, plastics, pharmaceuticals and lubricants.

There is a great group, probably the majority of companies, which sees no present possible connection between its business and atomic energy as we know it today. This is where being asleep might incur the greatest penalties and being vigilant might pay the biggest dividends. No one knows where the developments in this field are going to lead us. We do know that we are in the infant stage and that up to date a good many unexpected phenomena have shown up. We do know that in other big advances of human knowledge things which originally seemed troublesome by-products have turned out to be the bases of considerable enterprises. There is reason to believe that history will repeat itself here.

We may be facing such basic changes in the next generation of American industry that hardly any enterprise is warranted in blinding its eyes and stopping its ears to the things which will happen to us.

It is at least arguable that since basic science must go on in an expanded way and that the universities are unable to finance such work out of their own funds, it is highly preferable that industry should step into the breach with individual contributions rather than that Government in the absence of adequate private support should come to dominate this field.

MR. PIKE ASKS FOR CAREFUL CRITICISM

In conclusion there is another matter which has a real interest to all industry. Our Commission is spending several hundred million dollars a year of your money.

When I remind myself that our Commission is spending as much as it took to run the whole United States Government when I was a boy in grammar school, I am a little shocked and maybe you are too. Therefore, I ask you to look at our work carefully and critically; helpfully, if you can. It isn't enough to damn us as bureaucrats. Of course, I suppose we are bureaucrats. I worked for and have been acquainted with a good many business organizations and I found about as big a percentage of bureaucrats in them as I see in Government.

There is no use denying that power tends to corrupt. On the Commission we have a lot of power. We hope not to misuse it. If there ever was a job designed to keep five fallible men in a proper state of continual humility this one is it. But in the long run the judgment of the citizens of this country is conclusive and I hope you do your part in arriving at that judgment.

[*The following remarks form the concluding portion of Mr. Pike's ATLANTIC MONTHLY article, the first part of which cites examples of witch hunting in America.*]

LOYALTY AND THE SCIENTIST

This is all familiar enough and I think most of us see possibilities of the same sort of thing going on today, but it is a fair question to ask, "How does this bear particularly on the work of the Atomic Energy Commission?" Well, I think it does have a rather special bearing on our work. The degree of success in our job depends fundamentally on considerable numbers of scientific minds of the highest quality to carry on exploration into unknown or dimly perceived fields of research.

Such minds must be brilliant, curious, skeptical, and roving. They do not take things for granted. They must examine and re-examine conclusions reached by others before reaching their own decisions. They are usually deeply immersed in their own specialties. Sometimes this means in other fields a degree of unworldliness and naivete, particularly in political and social subjects. The qualities which are most valuable for their main work frequently lead them to be joiners of apparently good causes without realizing that they are joining under bad leadership.

Being used to scientific freedom of expression, they are apt to be outspoken on social injustices and unnecessarily tactless in exposing our own troubles here at home. We already have a good many of these top scientists and we shall need more, many more before we are through.

It is characteristic of these people that they were against the Spanish Franco before he was officially anathema. Some of them joined the American League for Peace and Democracy in the 1930's and a few of them have actually been reading the *New Republic*, the *Nation*, and *P.M.* Ordinarily Americans will not as a group take their cues for action or thinking from Martin Dies and his ilk. On this Commission we flatter ourselves that we are level-headed enough not to feel more than a slight irritation at their mouthings. At the present time, however, large numbers of people and part of the press seem to take them seriously, and there is reason to believe that this number is growing.

The heightening tension of our relationships with Russia and the infiltration of busy Communists into such organizations as labor unions and groups for social betterment may well add enough fuel to the fanatic's fire to bring about a public attitude of thoughtless panic and lead to what I have been calling "terrorization by epithet" by people whose motives are as un-American as those of the Communists themselves.

For myself I am pretty deeply disgusted with the tactics of the Russian government and the policies of encouraging world-wide turmoil and disorganization which apparently underlie those tactics. I do hope most fervently, however, that those who feel likewise will not allow their dislike of Russian methods to lead to the smearing and discrediting of fine, invaluable men who have at one time or another allowed themselves to be drawn into groups which have turned out to be more than the liberal movements which they appeared to be. Freedom of thought and inquiry is one of our most precious treasures. It is always subject to attack by people who have other bills of goods to sell.

In the emotional atmosphere which we now seem to be entering, it increasingly behooves us to be on our guard against that strident minority which would have us abandon our fundamental birthright of intellectual freedom for a sorry fascistic mess of pottage.

UNITED NATIONS ATOMIC ENERGY NEWS

Peter Kihss

The BULLETIN offers this first-hand report of events at Lake Success as a regular monthly feature. Mr. Kihss, a staff member of the NEW YORK HERALD TRIBUNE, has specialized in Atomic Energy Commission activities.

The Soviet Ukraine was finally elected to the Security Council, making it automatically a member of the United Nations Atomic Energy Commission for 1948. The end of November also brought an end to the General Assembly session. The way was thus opened for commission delegates to consider their next course.

With the commission recessed since September 11, some members—among them the United States and France—circulated draft views on the organization and administration of the projected international control agency. This was the next item under the majority plan of work voted last April 10.

But such delegations as the British were thinking of making the next commission job a detailed study of Soviet control views, as set forth last June 11 and in later oral and written statements. This represented no weakening in majority views, but rather an idea of exploring chances of agreement through a new approach.

Assembly delegates decided against a full-dress discussion of atomic control and disarmament because of weariness in their longest session yet, and apathy over any prospect of constructive results in the fifty-seven-nation world town meeting on that subject.

A chronology of events since the last BULLETIN, as they involve the U.N. atomic effort, follows:

October 30. General Andrew G. L. McNaughton, Canada's delegate, spoke to the University of Toronto Engineering Society, Ajax. Since available evidence indicates "there is no physical defense against atomic war," he saw two avenues of hope for preservation of the world:

1. "First and most attractive" is development of an international agreement whereby "without undue restriction on the peaceful uses of atomic energy and without the setting up of an unduly cumbersome organization, it would be possible to provide at the least several months' warning before atomic war could be launched by any nation on any significant scale. It is thought that the certainty of having such a period of warning during which appropriate counter measures could be taken should give the nations confidence to undertake the establishment of such a system which, once established, could be expected to develop in reliability." This is the U. N. effort.

2. "The second possibility of preserving peace, which is, I think, fully justified in the short term view by considerations of expediency and practicability, is that the United States, which is the only nation which at the moment possesses the atomic bomb in quantity, should be encouraged to continue to retain, for as long as may be possible, its paramount ascendancy in this field."

The Canadian delegate again endorsed the majority commission plan for an international agency operating dangerous atomic activities, subject to checks and balances. The idea that the menace of the atomic bomb might be solved merely by an international agreement to prohibit its use or manufacture, before controls were set up, was, he said, "unreal," and "would be an act of unilateral disarmament."

STATE DEPARTMENT & OSBORNE ANALYZE SOVIET POLICY

November 1. Frederick Osborn, deputy American representative to the commission, spoke at Washington and Jefferson College, Washington, Pa. He said he had started his own commission work eight months before "with a fine resolve to hammer out our differences, to meet each situation with an objective study of the facts, to reach those compromises which to us simple Americans appear the essence of a final and useful agreement."

But, he reported: "From month to month, it became clearer that the Soviet delegates were acting under the most strict and limited instructions from the Kremlin. They had no power whatever of independent negotiation. Indeed, all of us became more and more doubtful that they were even able to send back to Moscow a factual account of the negotiations which were taking place among the rest of us, of the new ideas introduced by one or another of the delegates, and the compromises and the logic of the final agreements.

"The delegates were, on the whole, an unusually able group of men, and much of the debate was of a high character. The French particularly excelled in a logical presentation of the elements entering into a treaty for the effective control of atomic energy.

"Yet, when the French spoke, we were forced to recognize that the Soviet delegates did not listen to them. They were intent apparently on making the debate between the United States and the Soviet Union, and their part in the debate consisted largely of arguments on procedure, of questions of good faith, or of hidden intent. When they discussed the actual work being done, their part in the discussion took the form of dogmatic assertions.

"We found that the examination of objective facts did not seem a part of the scheme of things envisaged in Soviet training. They appeared to have one criterion only, the infallibility of the Kremlin. Hence, no compromise, no discussion, is possible. Such a criterion, I need hardly say, is unacceptable to the Western European mind. We feel perplexed in the face of such logic."

November 3. The State Department issued a sixty-page pamphlet, entitled "Aspects of Current American Foreign Policy," Department of State Publication 2961[1].

1. Printed in an issue of 100,000 copies, the pamphlet is for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at twenty cents.

Chapter 7, on "Armaments and Atomic Energy," said the United States had traditionally favored regulation and reduction of armaments. But the United States, the department wrote, does not intend to repeat the unilateral, unregulated disarmament policy followed between World Wars I and II, which, in the absence of political and economic conditions of international security, "merely encouraged warlike powers."

In the field of atomic energy, the department wrote that "we have vigorously maintained that immediate priority should be given to achieving international control of this force and establishing safeguards against its misuse."

"The Soviet counter-proposals," it went on, "have not provided satisfactory solutions to the key problems of safeguards, including international control and inspection, and the circumstances in which atomic weapons would be eliminated from national armaments.

"In the absence of unanimous agreement on these problems, the Atomic Energy Commission may find itself unable to fulfill its responsibility for drafting plans for international control."

DO THE RUSSIANS HAVE THE BOMB?

November 6. Soviet Foreign Minister Viacheslav M. Molotov told a Moscow audience, celebrating the thirtieth anniversary of the Russian Revolution, that the secret of the atomic bomb "has long ceased to exist," and his statement provoked a flurry of comment at U. N. headquarters.

Asked whether this meant the Soviet Union actually had atomic bombs, Andrei Y. Vishinsky, chief Soviet delegate to the Assembly, told reporters: "It's difficult to make any guesses on such a statement. What Mr. Molotov said is enough." The tendency among other delegates was to interpret the Molotov statement simply as a reiteration of the fact that all nations know the fundamental principle of the atomic bomb.

The Molotov charge that "the United States of America and Great Britain hamper the United Nations from adopting a final decision on the prohibition of atomic weapons" drew sharp American and British counter-attack.

Mr. Osborn said on that point: "We have heard most of what Mr. Molotov said many times before. It wasn't true then, and it isn't true now. Nor does constant reiteration make it any less false. . . . It is actually the U.S.S.R. which is, and has been, preventing agreement.

"I might point out that not only the United States, but thirteen other countries which have participated in the deliberations of the United Nations Atomic Energy Commission, have flatly refused to accept the Russian thesis.

"On the other hand, it is the U.S.S.R. alone which blocks agreement by refusing to accept the safeguards which the thirteen other delegations have decided are indispensable for safeguarding their individual and collective security.

"It is still a case of everyone being out of step but the Soviets."

Hector McNeil, chief British delegate to the Assembly, said Russia must bear "primary responsibility for holding up both atomic energy and conventional disarmament." Sir Alexander Cadogan, chief British atomic delegate, said: "The Soviet Union has never uttered a generous word about the American attitude. The American government first obtained and applied atomic energy. What has it done? It has offered to share it and to outlaw the atomic weapon, with agreement for verification and proper control. This is a very great offer to make. But America is not so naive as to give it away without control."

External Affairs Minister Herbert V. Evatt, of Australia, said the chief factor in delaying outlawry of atomic bombs and establishment of controls to insure peaceful uses of atomic energy was "the deliberate tactics of the U.S.S.R. in obstructing the principles of the Baruch-United States plan. . . .

The Soviet attitude toward it—although improved somewhat in recent months—has been on the whole unhealthy and negative."

Faris el Khouri, of Syria, doubted that the Russians had gotten atomic bombs, but voiced faith that "when the atomic bomb is universal, nobody will dare use it—as in the last war, nobody dared use poisonous gas." Fernand Van Langenhove, of Belgium, saw no reason in the Molotov statement for "interrupting the work of the Atomic Energy Commission."

V. K. Wellington Koo, of China, said: "In my opinion, whether the secret of the atomic bomb still exists or has ceased to exist, is a matter of secondary importance to the peace-loving peoples of the world. What is of primary importance is the fact that no people of any country wants another war. It seems to me that on this basic fact alone we can take an optimistic outlook of the future. All we really need is a mutual desire for understanding and a real spirit of international cooperation."

The Commission for Conventional Armaments held a meeting of its working committee the same day. There Ralph A. Bard, deputy American representative, stressed the belief that three conditions are necessary to arrive at a state of world confidence and security, amid which disarmament could take place. These conditions would be: agreement on United Nations armed forces under Article 43 of the charter, "establishment of an international control for atomic energy," and signing of the German and Japanese peace treaties.

ANALYSES BY BARD AND AUSTIN

November 10. Warren R. Austin, chief American representative, spoke at the Woodrow Wilson Foundation dinner in honor of Bernard M. Baruch, in New York City. The concept of world control of atomic energy to insure its use for peaceful purposes only, Mr. Austin said, is "the most striking example of our progress in formulating plans for world organization."

The United States proposals, first presented to the U. N. by Mr. Baruch, were acclaimed for "unprecedented boldness, generosity and fairness," Mr. Austin said. He added: "They called for no greater abatement of traditional concepts of national sovereignty than was absolutely essential to effective control. . . . They were regarded as the bedrock of effective control." Ten of the twelve 1946 delegations, Mr. Austin recalled, agreed "the solution offered by the Soviet Union would be completely ineffective."

During 1947, he said, the majority continued constructive work with "a truly remarkable spirit of cooperation and singleness of purpose." In

the second report, "no one delegation had a monopoly of ideas." But the Soviet Union, while asked to participate, declined to take part in the working groups, Mr. Austin said. He declared the majority has "determined that the only constructive work that can be done must be based on the majority proposals thus far made."

"This is not a matter of who is right, but rather a question of what is right and what is necessary," Mr. Austin said. "Here we are dealing with a set of scientific and technical facts that have to be faced and their demands satisfied. The ten delegations and their scientists constituting the majority have not arrived at their conclusions and proposals by following whims or political notions."

WHO IS BLOCKING AGREEMENT?

November 11. Both Mr. Vishinsky and Mr. Austin spoke at the Foreign Press Association dinner in New York City.

The Soviet Assembly delegate said the Assembly's unanimous condemnation of war propaganda enhanced the authority of the U. N. "and its moral and political importance in international relations, a fact which friends of peace cannot but hail." He went on:

"Last year an important step was made toward peace when a resolution was adopted on a general reduction of armaments, including prohibition of the atom bomb—a step which unfortunately has not yet borne any fruit, as a result of the resistance on the part of the leaders of the United States foreign policy, who, moreover, believe that they hold a monopoly in the production of the atomic bomb.

"In the same way the U. N. is making now an important step toward maintaining peace by condemning propaganda for a new war. But will this step bear better fruit than in the case of the decision on general reduction of armaments?. . . . I must say that there are ominous signs of directly opposite trends."

Mr. Austin paid tribute to Albert Einstein, who was receiving a Foreign Press Association plaque for his work as chairman of the Emergency Committee of Atomic Scientists, and continued:

"I would imagine, however, that Dr. Einstein was surprised this past week to see a statement which many of his colleagues have been making for months suddenly become a first-page headline. Atomic scientists in this country, as well as in Britain and Canada, often have stated publicly: 'The secret of atomic energy has long ceased to exist.' The basic scientific facts are widely known. The greatest secret was publicized when the bomb was dropped at Hiroshima.

"I only hope that the efforts of the atomic scientists to promote greater awareness of the nature of the atomic discovery will not be discouraged by the evidence that their words gain attention only when they appear under a Moscow dateline and are expressed by a distinguished political scientist.

"It is the atomic scientist who will tell you that there is a great gap between the possession of a scientific fact and the possession of a knowledge and technique of operation. And it is the atomic scientist who will tell you most earnestly that, in the field of atomic energy, mere prohibition of atomic weapons would not be enough—it would be a fraud. It is the atomic scientists who will tell you that development of a system of control of atomic energy in all its phases, which will protect the complying state against the hazards of violations and evasions, is a minimum essential.

"The events of this past week demonstrate that, somehow or other, the media of information apparently have failed to convey what I believe is one of the most dramatic news stories of our time. The discoverers of atomic energy have offered to give up their discovery to an international authority which would exercise control to insure its uses for peaceful purposes only.

"Fifteen nations have served thus far on the Atomic Energy Commission. Three of them have passed off when positions changed over. Of this number, thirteen have made great progress in working out essential details.

"And yet Foreign Minister Molotov charges that it is these thirteen rather than the two which are blocking efforts toward agreement. Tonight we heard Mr. Vishinsky repeat this charge that it is the intransigeance of the State Department which has blocked agreement.

"I say to you in all solemnity that if the facts, which are available, were conveyed effectively to the people of this world, through you and your colleagues, such a statement would cost its maker the confidence of his hearers."

PRE-ADJOURNMENT DISCUSSIONS

November 13. The Assembly elected the Ukraine to the Security Council—and thus to the Atomic Energy Commission—when India announced withdrawal from the race which had deadlocked on eleven earlier ballots beginning September 30. The vote on the twelfth ballot was Ukraine 35, India 2, abstaining 15 (including the United States), invalid 2. Mrs. Vijaya Lakshmi Pandit said India withdrew to avert any responsibility for forcing a change in Assembly rules of procedure. She served notice that India would raise the issue of better geographical representation later, noting that, on the expiration of Australia's term, the Indian ocean area, with 500,000,000 population, becomes unrepresented. The election completed the 1948 Security Council —and the atomic commission — with Argentina, Canada and the Ukraine taking over seats to be vacated by Australia, Brazil and Poland. (Canada, by special provision, had already been a member of the atomic commission).

November 19. Plan's for a debate on atomic controls and disarmament were shelved in the Assembly political committee, when all hands agreed, without discussion, to a Norwegian resolution simply to "note" the 1947 report of the Security Council to the Assembly. Poland, which had a resolution all drawn up, bringing in the biological warfare problem as well, desisted when it encountered widespread apathy.

November 26. Leaving for London on the Queen Mary, Mr. Vishinsky issued a statement regretting that the Assembly had "bypassed the questions of general disarmament and suppression of atomic weapons." This was a barb at majority deletion of the issue from the resolution against warmongering.

November 29. The Assembly adjourned its 1947 session.

THE FEDERATION OF AMERICAN SCIENTISTS

W. A. Higinbotham

Mr. Higinbotham sums up two years of work in the Federation of American Scientists and its related organizations. The activities here recorded are due in no small measure to the efforts and enthusiasm of Mr. Higinbotham himself, who left his research job at Los Alamos in the fall of 1945 to help organize this educational campaign. He has just resigned as Executive Secretary of the FAS to become Co-chairman of the Electronics Department at Brookhaven National Laboratory.

"We can expect no enduring monopoly of the atomic bomb—no hope of adequate defense—with the world-wide distribution of atomic ores, unlikely that the United States could monopolize—international control of atomic bombs is technically feasible—lack of decision within even a few months will be preparing the world for unprecedented destruction—it is reasonable to expect that bombs of even greater destructiveness will be available in the near future—a world in which nuclear weapons are owned by many nations and their use held back by fear of retaliation would be a world of fear, suspicion, and inevitable final explosion—the actualities of the situation require a drastic solution and the atomic bomb is a sufficiently revolutionary force to impel us to such a solution."

Two years ago, the scientists at Chicago, Oak Ridge, and Los Alamos were carefully preparing these statements. They had little idea of engaging in politics or leading a movement, but they knew that the people of the world had to learn the facts before it was too late; they realized that only a few had known them and had thought them through. The facts and the immediate conclusions seemed to be easy enough to grasp, but public education, even in this dramatic subject, proved to be difficult. The scientists' movement was not planned; it has grown and changed in an effort to meet the needs.

This is an appropriate time to review this growth and to present an account of the current activities. The account which follows is very condensed and will only refer to the activities that are most directly related to the efforts of the atomic scientists.

THE ATOMIC SCIENTISTS EXPAND INTO FAS

The first organizations were formed by scientists at the various Manhattan Project sites to draft statements and to press for an opportunity to make them public. Shortly, representative members went out to make contact with public and political leaders. In October of 1945 the Administration tried to rush passage of the May-Johnson bill for domestic control of atomic energy. This move, which threatened to perpetuate military control of atomic energy in the United States, galvanized these scientists into action. It also stimulated the formation of other local associations of scientists.

The need for an active organization to coordinate and present scientists' thinking was recognized and eight atomic scientists met in Washington the first of November to set up the Federation of Atomic Scientists. Its first activity was to support a resolution calling on the United States to take the lead in trying to achieve world control of atomic energy. This resolution was introduced in the House of Representatives and found considerable support in the Senate. The May-Johnson bill was stopped and the Federation was invited to testify before the McMahon Committee. A classified study of the technical problem of world control was initiated.

At this time there were no officers and little organization. Scientists came in shifts from the various groups and talked to anyone who would listen, but they soon began to understand what was needed and speedily took steps to set up more permanent programs. Meetings were called in November to prepare the ground for formation of the Federation of American Scientists and the National Committee on Atomic Information.

On the bomb project, all kinds of scientists and engineers performed vital tasks. Elsewhere, specialists with the same backgrounds worked on rockets, radar, biological warfare and a wide variety of other military projects. Some of the latter formed associations at an early date and their representatives attended the first meetings in Washington. At subsequent meetings a constitution was drafted and the Federation of American Scientists was formed early in January of 1946.

The Federation of American Scientists now has about 2,500 members in its 18 local associations. Membership is open to those with a bachelor's degree in the natural sciences, engineering or mathematics. Non-scientists may be admitted to local membership. Recently, the Federation has begun a drive for members-at-large and associate members-at-large, especially to bring in those who do not find it convenient to join the existing local chapters.

The policy body of the Federation is the Council which consists of one delegate from each local association. It has met ten times in the last two years. It elects the officers and the administrative committee. The national office in Washington collects and distributes information, raises funds, and carries on liaison with the National Committee on Atomic Information and countless individuals in public life.

The Federation of American Scientists took over the activities of the Federation of Atomic Scientists. In the spring of 1946 it was primarily concerned with atomic education and with the proceedings of the McMahon Committee. The first big test came

with a move to amend the McMahon Bill. As originally drafted, there was no provision for liaison with the armed services. An amendment was proposed which would have given a military board control over the civilian commission. The Federation called emergency meetings with the representatives of other organizations and with them alerted the country to the danger. Under public pressure the amendment was revised and later the bill was passed. Again, in the spring of 1947, the Federation took a strong stand for the confirmation of Mr. Lilienthal and the members of the Atomic Energy Commission.

The political issues are perhaps the best known, but they have not been the major work of the Federation. It endorsed the State Department Report on the control of atomic energy and has tried to interpret the issues of atomic control. It continues to warn, as scientists warned in October of 1945, that "leadership in an atomic armament race will in no way assure our safety against sudden attack by an aggressor; achievement of international controls over the military aspects of atomic power must remain the paramount objective of our national policy". It has urged international distribution of radioisotopes and has worked for a sane program of security in the atomic field. As time has permitted, it has discussed other problems in which scientists can make a special contribution, such as national science legislation, UNESCO and the civil rights of scientists.

Perhaps some scientists have viewed the activities of the Federation with misgivings, but it is significant that all scientists have stood together on the major issues. Without such an organization the impact could not have been so great. Every effort is made to achieve a representative membership and to be sure that the policies adopted truly represent the opinions of the membership. Yet some opposition has been encountered. One outstanding member was forced to resign by a prominent government agency and a prominent eastern university has refused to allow our chapter to meet on its campus.

Finances have always been a serious problem although the organizational structure has been quite modest. At first the scientists dug deep into their own pockets. Sympathetic friends arranged dinners and solicited donations. But the novelty soon wore off. And because its activities have included political action, gifts to the Federation cannot be deducted on income tax reports. Membership dues pay for about one quarter of the costs of operation. Many scientists make additional contributions. But future activities will have to be curtailed unless more contributors can be found.

AFFILIATED ORGANIZATIONS ENGAGE IN EDUCATION

Shortly after the Federation of Atomic Scientists was formed, leaders of national organizations were invited to a meeting in the Mayflower Hotel in Washington. They heard several scientists explain their message and the urgent need for widespread understanding of the facts. The organizations accepted the challenge and within a month they set up the National Committee on Atomic Information.

The purpose of the NCAI was to make available to the scientists the facilities of its member organizations, and it so stimulated the organizations that atomic energy has been a major topic for discussion and study. The NCAI office has been a clearing house for popular atomic information, serving its member organizations and also the press, radio, libraries and other interested agencies and individuals. It has prepared aids for community programs and has given assistance to a wide variety of projects in atomic education.

In the spring of 1946, the NCAI set up a fund-raising committee of prominent scientists. Later this committee became separately incorporated to raise funds for educational work. The committee has issued a number of important statements, and has continued to support the work of the NCAI and the educational activities of the scientists.

The main task of the Federation of American Scientists was educational, but because of its financial problem it was not able to carry on an effective program. So an entirely separate scientists' organization was formed in January of 1947. This group is supported by dues and grants from the Emergency Committee of Atomic Scientists. It cooperates with the NCAI in educational programs and conducts a number of educational activities of its own.

It was realized at an early date that the conventional techniques of mass education were inadequate. A program was needed which would stimulate citizens to think and to examine every phase of national and international policy in the light of the new forces. In the spring of 1946, several local associations of the Federation began to experiment with conferences and institutes. Chicago and Pittsburgh held conferences with local leaders in labor, business, religion, etc. The scientists of Oak Ridge toured the major cities of the state of Kansas. These programs are now carried out by the ASAE in cooperation with the NCAI.

Another activity which is now supported by the ASAE is the Committee for Foreign Correspondence. Science has always been international and American scientists have many personal friends abroad. The Committee for Foreign Correspondence was organized to encourage scientists to correspond with these friends, to send them information about the educational work which scientists are doing here and to exchange views with them on world affairs. This committee, now operating from Berkeley, has records of correspondence with over a thousand scientists in most of the countries of the world.

A liaison committee coordinates the activities of the ASAE, the NCAI and the Emergency Committee of Atomic Scientists.

A thorough survey would describe the work of the students of the University of Southern California in their Council on Atomic Implications, the Rocky Mountain Council on Atomic Energy and many other groups that have sprung up to assist in the job. This report may help to make clear the present status of the principal national organizations. It is confusing, admittedly, and steps should be taken to simplify and streamline the organizational structure. The accomplishments of the scientists' movement may seem considerable, but there is no international agreement on control of atomic energy and the atomic arms race which they predicted is a frightening reality. The world is still largely unconscious of the new power in its hands. The organizations that have been described and the others which have worked with them must apply the experience they have gained in a fresh and insistent effort to carry on the educational work so enthusiastically begun.

SCIENCE AND PUBLIC POLICY

A Report by the President's Scientific Research Board

On August 27, Dr. John R. Steelman, Chairman of the President's Scientific Research Board, presented to the President the first of five volumes of the report entitled "Science and Public Policy". The first, "A Program for the Nation", outlined a broad program of research and development. The second and third volumes, "The Federal Research Program" and "Administration for Research", dealt with the activities of the Government and means for their more effective promotion. The condensation presented here is based on material contained in these first three volumes. Volume IV, "Manpower for Research" and Volume V, "The Nation's Medical Research" will be summarized in an early issue of the BULLETIN.

PART I: SCIENCE FOR THE NATION

A national plan designed to assure our scientific future in the atomic age has been outlined for the President in the report of the Chairman of the President's Scientific Research Board.

The report is concerned with the role of science for the Nation as a whole and as a function of the Federal Government.

SCIENCE AND THE NATIONAL INTEREST

On the first and more important issue, the report states, at the outset that "the security and prosperity of the United States depend today, as never before, upon the rapid extension of scientific knowledge." Science is essential to military progress; it is equally significant in combating poverty and disease and in raising living standards. Other nations are pressing ahead in scientific organization and may soon threaten our position of world leadership. Our strength in the past arose from our ability to apply basic scientific principles and theory generally conceived in Europe. Now it becomes our responsibility to emphasize fundamental scientific inquiry at home. The most serious limiting factor today is shortage of trained manpower. We must train young scientists who can pursue basic researches, not alone the findings of others.

On the second point, the report reveals that during 1941-45, five-sixths of the $600 million average annual expenditure for research and development was paid for by the Federal Government. Its influence and scope are vast and directly determine many of the scientific activities of the Nation. Virtually every subject is explored in the Federal program, although greatest emphasis today is on military research. The problems before us are determination of the proper balance within Government, the more effective coordination of research efforts and improvement of methods for financing research.

Urges Federal Support of Broad Program

The report confirms the belief previously expressed by the President that the national welfare requires support by the Federal Government of basic research in universities and non-profit research institutions, through creation by the Congress of a National Science Foundation. This Foundation should be set up from the outset in accordance with sound principles of administration and with the recognized democratic controls that should characterize all our public institutions.

In the light of the world situation and of the position of science in this country, this report will urge:

1. *That, as a Nation, we increase our annual expenditures for research and development as rapidly as we can expand facilities and increase trained manpower.* By 1957 we should be devoting at least one percent of our national income to research and development in the universities, industry, and the Government;

2. *That heavier emphasis be placed upon basic research and upon medical research* in our national research and development budget. Expenditures for basic research should be quadrupled and those for health and medical research tripled in the next decade, while total research and development expenditures should be doubled.

3. *That the Federal Government support basic research in the universities and nonprofit research institutions* at a progressively increasing rate, reaching an annual expenditure of at least $250 million by 1957.

4. *That a National Science Foundation be established to make grants in support of basic research,* with a Director appointed by and responsible to the President. The Director should be advised by a part-time board of eminent scientists and educators, half to be drawn from outside the Federal Government and half from within it.

5. *That a Federal program of assistance to undergraduate and graduate students in the sciences be developed* as an integral part of an over-all national scholarship and fellowship program.

6. *That a program of Federal assistance to universities and colleges be developed in the matters of laboratory facilities and scientific equipment* as an integral part of a general program of aid to education.

7. *That a Federal Committee be established,* composed of the directors of the principal Federal research establishments, to assist in the coordination and development of the Government's own research and development programs.

8. *That every effort be made to assist in the reconstruction of European laboratories* on terms which require the

maximum contributions toward the restoration of conditions of free international exchange of scientific knowledge.

NATIONAL RESEARCH AND DEVELOPMENT BUDGET

The national research and development effort is the product of the combined activities of industry, the universities, and the Government.

Since the turn of the century, research expenditures of all three groups have steadily increased, with Government expenditures growing most rapidly.

During the 'Thirties, we doubled our total private and governmental research expenditures, increasing them from $166 million in 1930 to $345 million in 1940. In terms of our national income, such expenditures were relatively modest, never amounting to more than one-half of 1 per cent. (See Table I.)

Had the war not forced a tremendous expansion in research and development, we would nevertheless have increased the program significantly during the decade 1940-1950. The same factors responsible for "natural" growth in the 'Thirties would probably have doubled research and development expenditures once again in the subsequent decade.

Effect of the War and Budget for 1957

In the five years from 1941 to 1945, the Nation spent $3 billion for these purposes, almost all of it going for developmental work on implements of war. About 83 percent of the total cost of this huge program was financed by the Federal Government.

Peak annual expenditures during the war for all research and development in the Nation amounted to more than $800 million in each of the years 1944 and 1945. In the latter year, the Federal Government expended virtually all of the national total—$750 million.

Despite these vast expenditures during the war, the Nation's postwar budget for research and development during 1947 reached the highest point in our history—more than $1.1 billion. (See Table II)

The size of the national research and development budget is today probably about as high as it can effectively go, in view of present limitations upon our resources in trained manpower and facilities. But it is not as high as it should go in the immediate future. By 1957, we should have at least doubled our present budget for this purpose.

The reasons underlying this conclusion have already been touched upon. They are:

1. *Need for Basic Research.* Much of the world is in chaos. We can no longer rely as we once did upon the basic discoveries of Europe. At the same time, our stockpile of unexploited fundamental knowledge is virtually exhausted in crucial areas.

2. *Prosperity.* This Nation is committed to a policy of maintaining full employment and full production. Most of our frontiers have disappeared and our economy can expand only with more intensive development of our present resources and a growing research and development program.

3. *International Progress.* By strengthening our economy through research and development we increase the chances for international economic well-being.

4. *Increasing Cost of Discovery.* The frontiers of scientific knowledge have been swept so far back that the mere continuation of prewar growth requires more time, more men, more equipment than ever before in history.

5. *National Security.* The unsettled international situation requires that our military research and development expenditures be maintained at a high level for the immediate future.

MANPOWER: THE LIMITING RESOURCE

Under present conditions, the ceiling on research and development activities is fixed by the availability of trained personnel, rather than by the amounts of money available. [Further discussion of the limitations on scientific manpower is omitted here since the BULLETIN expects to present a condensation of Vol. IV, "Manpower," in its next issue.]

The shortage of scientific manpower in the colleges and universities renders the universities and colleges less able than formerly to expand basic research at a time when such expansion is urgent; and makes it less likely that students now enrolled will receive the rigorous training necessary to the successful expansion of basic research in the future.

A NATIONAL SCIENCE PROGRAM

As a Nation, we should spend each year no less than one percent of our national income for research and development in the physical and biological sciences, including medicine—a modest annual investment in view of the importance of scientific advance to our society, and of the increased productivity to be anticipated from such an expenditure.

We will have the trained manpower to support a program of this magnitude by 1957. Assuming in that year a national income of over $200 billion, our national research budget should then be more than $2 billion.

A substantial part of the money for such a program will have to be supplied out of taxes—and should be. It is difficult to think of any other national activity which more directly benefits all the people or which makes a larger contribution to the national welfare and security.

There is every reason to anticipate a doubling of research and development expenditures by industry in the next decade, but there is little likelihood of any considerable expansion of university expenditures out of their present income sources. Endowment income has sharply declined; the large fortunes which were the source of new endowment funds are now considerably limited by taxation. So far as State-supported institutions are concerned, the long-run financial position of many states makes large increases in university support unlikely.

A similar situation confronts the private foundations. They have contributed enormously to the support of basic research, but their expenditures have been small in terms of the total budget. It is not likely that their share will expand in the future.

In view of these considerations, we should anticipate Federal expenditures in support of research and development of more than $1 billion a year by 1957.

TABLE I.

Comparison of national research and development expenditures, 1930-1945 (excluding atomic energy)

Year	Millions of Dollars Expended					Percentage of Total Expenditures			
	Total	Federal Government	Industry	Universities	Other[1]	Federal Government	Industry	Universities	Other
1930	166	23	116	20	7	14	70	12	4
1932	191	39	120	25	7	20	63	13	4
1934	172	21	124	19	8	12	73	11	4
1936	218	33	152	25	8	15	70	11	4
1938	264	48	177	28	11	18	67	11	4
1940	345	67	234	31	13	19	68	9	4
1941-45 average	600	500	80	10	10	83	13	2	2

1. State Governments, private foundations and research institutes, including nonprofit industrial institutes.

TABLE II.

The national research and development budget 1947 (excluding atomic energy) (In millions)

Agency	Total	Expenditures in 1947	
		Basic Research	Applied research and development
Total	$1,160	$110	$1,050
Federal Government	625	55	570
War and Navy Depts.	500	35	465
Other departments	125	20	105
Industry	450	10	440
University	45	35	10
Other	40	10	30

Distribution of Federal funds:

	Total	War & Navy	Other
Total	$625	500	125
Government laboratories	200	100	100
Industrial and university laboratories on contracts	425	400	25

TABLE III.

National research and development budget for 1957 (In millions)

Type of activity	Amount	Proportion of total budget
Basic research	440	20
Health and medical research	300	14
Nonmilitary development	1000	44
Military development	500	22

While the Federal Government will have to finance at least half of the national research and development budget, it does not follow that it should perform half of the work in its own laboratories. Even at the present time, the bulk of Federal funds is expended in industrial and university research facilities. Government laboratories used only $200 million of the $625 million Federal outlay in 1947, while industrial facilities and university laboratories received the 68 percent. If military research and development expenditures alone are considered, 80 percent went for work in industrial and university facilities.

There is no reason to recommend any substantial change in this general pattern for the future. The general emphasis in the universities is upon basic research while that of the industrial research laboratories is overwhelmingly on development. The Government laboratories stand somewhat between the two, but their programs on the whole are also heavily weighted toward development.

Our present research and development program is unbalanced in these three respects:

We are devoting too small a proportion of our total resources to basic research;

We are devoting too small a proportion of our total research and development resources to health and medicine;

We are devoting too small a proportion of our development resources to non-military ends.

These deficiencies in our present program should be corrected as rapidly as possible so that by 1957 we will be spending four times as much on basic research, three times as much as at present on research in health and medicine, twice as much as at present on non-military development.

Assuming that expenditures for military research can be held in that year to about their current levels, we would have a national research and development budget for 1957 about like that indicated in Table III.

The principal function of the colleges and universities is to promote the progress of learning and they must be the primary means through which any expanded program of basic research is carried out.

The bulk of the expansion must come in the universities and colleges and be financed by Federal funds. For this purpose, we require

a National Science Foundation with adequate financial support. The Federal Government should spend about $50 million for support of basic research outside of its own laboratories in 1949. From that point, grants for basic research should increase rapidly until they reach an annual rate of at least $250 million by 1957.

The National Science Foundation

Most of the funds in support of basic research should be expended through a National Science Foundation, responsible to the President. While such support must be a part of a broad, integrated national program not only for science but for education, there are characteristics of basic research which make the foundation approach particularly desirable in this field. Planning in basic research—or for the expenditure of funds in its support—is mainly concerned with broad attempts to indicate the fields of investigation most worthy of exploration and with the enlistment of scientists in those areas.

Basic research is the exploration of the unknown and its support requires daring and imagination. Possibilities, in many instances, are apparent only to trained scientists.

For these reasons, among others, it is vital that funds for the support of basic research be administered with the advice and counsel of an imaginative group of scientists. But this necessity should not blind us to the relations of a grant program for basic research, to the total science program of the Government or to the other national programs in support of education. Nor can it justify a departure from our traditions of democratic government or from tested principles of administrative organization.

As the president stated in his Memorandum of Disapproval of August 6, 1947, in respect to S. 526, the role to be played by a representative group of scientists in the administration of the National Science Foundation is "more appropriately one of an advisory nature rather than a full responsibility."

It is, therefore, recommended that the Congress be urged to establish at its next session a National Science Foundation within the Executive Office of the President and that the Foundation be authorized to spend $50 million in support of basic research its first year, with increasing amounts thereafter, rising to an annual rate of at least $250 million by 1957. No restrictions should be placed upon the fields of inquiry eligible for support.

While the support of basic research through the National Science Foundation is of the utmost importance, it is only one of several elements in our total national science program. Our developing program of Federal support for higher education has included the provision of surplus equipment and facilities and a vast national scholarship system under the Servicemen's Readjustment Act. That program has been an emergency one. We must soon develop a permanent, long-range program of Federal assistance to students and of Federal aid to education in general.

Viewed in perspective, the support of basic research in the colleges and universities is a part of such a program. It can achieve results only as the colleges and universities themselves are strong and only as means are found to permit able students to pursue their studies.

It is important that we maintain this perspective in the future. For it suggests the desirability of treating support for science as a part of a broader program for the extension of knowledge and the improvement of the education of our people.

In such terms, it is clear that a portion of the funds expended by the National Science Foundation should be used to strengthen the weaker, but promising, colleges and universities, and thus to increase our total scientific potential.

Finally, it is probable that provision should be made for the location of the National Science Foundation within any new Department of Health, Education and Security which may be set up in the future.

It would be a serious mistake to establish a scholarship or fellowship program in the physical and biological sciences alone.

What we require is to extend educational opportunities to all able young people, leaving it to them to determine the field of study they desire to pursue. No agency of the Government is sufficiently far-seeing—nor ever likely to be—to foretell 15 or 20 years in advance the fields in which we shall most need trained people. In free competition, the physical and biological sciences will get their share.

New Facilities Are Needed

A national research and development program of the size we require will necessitate a considerable expansion of research facilities.

The value of Federally-owned and operated research facilities—excluding those of the Atomic Energy Commission—is approximately $1.5 billion. Over two-thirds of this investment is in Army and Navy installations. The Atomic Energy Commission has facilities which cost another $1.5 billion. Industry owns facilities valued at nearly $1 billion, and educational institutions and other nonprofit research institutions account for $300 million more.

While we cannot now estimate how much of an expansion in laboratories and equipment will be required by a national program twice as large as our present one, it is likely that it will be proportionately less than the increase in research and development expenditures. This is true because of the emphasis upon the non-military and the basic research programs. These require less extensive installations, as a rule, than does military research and development.

While the enlarged role contemplated for the Federal Government will not necessarily be reflected in a comparable increase in Federally-owned and operated facilities, considerable increase is desirable. Recently acquired knowledge in several areas of applied science—particularly those related to missiles and supersonic flight—necessitates immediate construction of additional facilities. Likewise the saturation of certain of our medical facilities and our failure to provide expansion during the war period, makes an increase in certain specialized medical facilities urgent.

Except in the event of a military emergency, it is unlikely that the Federal Government will have to finance the necessary expansion in industrial research facilities. We should provide a favorable climate for such expansion through tax incentives and

other established methods, without making direct grants to industry.

Existing facilities are relatively less adequate here and require substantial expansion. Additional libraries, laboratory space and equipment are urgently needed, not only in terms of the contemplated program of basic research, but to train scientists for research and development programs in the future.

Provision must, therefore, be made for Federal aid to educational institutions for the construction of facilities and the purchase of expensive equipment. A beginning was made on this in connection with the disposal of surplus property. It must now be put on a long-run basis.

Any such program for Federally-financed research facilities should be a part of a broader program of aid to higher education. In many cases, the expansion of laboratories is possible only if other expansions in plant occur. The whole problem of university and college facilities is a broad and integrated one and should be handled as such.

International Aspects of the Program

The past dependence of the United States upon the scientific contributions of Europe has been emphasized in this Report, together with the steps it is necessary for us to take to fill the gap caused by the destruction of European laboratories. *A reasonable proportion of any reconstruction aid we can give to countries abroad should be assigned to the re-establishment of those conditions in which science can flourish.*

The positive aid which the United States can give to the world development of science takes several forms:

First, there is aid in the construction and equipment of scientific laboratories in the universities of Europe and Asia as a part of the over-all plans for re-establishment of healthy economies in those areas.

Second, it is important to stimulate an increased international flow of students of science, and of professors and research workers.

In the interim reconstruction period scientists can be sent abroad to bring their European colleagues up to date on the scientific developments of the last five years. Attention might well be given to sponsoring lecture tours to the principal universities of Europe by several hundred of our leading scientists.

In the same way we should encourage students from abroad to attend our universities and colleges.

Another instrumentality of international cooperation which should be a part of any national science program is the establishment of scientific missions abroad.

PART II: SCIENCE AND THE FEDERAL GOVERNMENT

THE FEDERAL SCIENTIFIC PROGRAM

Permeating the entire Federal program is an extension of the war-stimulated practice of supporting research and development in non-Federal installations through grants, contracts and fellowships. This emerging policy not only links the Federal and non-Federal programs more closely, but creates technical and policy problems that must be dealt with wisely if the full values of industrial, university, foundation and governmental research are to be forthcoming.

In the course of the studies contributing to this report, every non-military research and development agency of the Federal Government submitted a description of every current project. Virtually no duplication of effort was found. The problem is not elimination of overlapping work, but synthesis of the entire effort in a manner which will make the program as a whole most effective.

The Federal Government carries on its scientific work under 41 bureaus operating within most major agencies of the Government, at installations widely distributed throughout the country.

The Constitution charges the Federal Government with a primary or exclusive responsibility for the national defense and for the development of standards of weights and measures, and for the necessary scientific studies and applications in these fields.

The Federal Government is also charged with control over interstate commerce, navigation, and many other activities of interest to the Nation as a whole. Scientific inquiry is necessary to the effective performance of these functions. Thus, research concerned, for example, with the qualities of goods transported in interstate commerce, coast and geodetic surveys and flood control are now universally accepted as proper and necessary functions of the Federal Government.

Under the authority over post offices and post roads, extended to include civil aviation, the Government conducts scientific studies of vital importance. Title in a vast public domain held in trust for our people by the Government requires scientific studies in aid of reclamation and conservation.

The sweeping general welfare clause of the Constitution calls for scientific study in aid of agriculture, fisheries, and a wide variety of other national activities.

The authority granted by the Congress to executive agencies is, in general, adequate to permit the establishment of a sound Federal research and development program. In two major respects, however, the laws could be changed to make the program more effective.

Grants Are Preferred to Contracts

Both war and post-war experience have demonstrated that support for basic research should be provided by *grants* rather than *contracts*.

A contract is adapted to purchase of a specific product with specifications that can be set in advance; costs can and should be carefully scrutinized. But grants—a gift made to individuals or institutions whose competence has been demonstrated for the purpose of an investigation whose outcome cannot be known precisely in advance—are a more appropriate device for support of basic research. Only in the laboratory where the work is conducted can needs for apparatus, special facilities and equipment be promptly and properly evaluated. This objective is secured more readily if the research is financed by grants rather than by contracts.

Every Federal agency with major research responsibilities should have

authority to make grants for basic research, the entire program, as suggested above, to be coordinated by the National Science Foundation.

The nature of basic research suggests a second broad revision of statutes. Most projects cannot be planned and executed in less than three to five years. This means that investigators must be reasonably assured of support over this period before men, equipment and other facilities can be assembled. Federal grants are, however, typically limited to one year because the government's operations are financed on a fiscal year basis.

Congress has recognized the difficulties. Funds obligated for research by the Office of Naval Research and the Atomic Energy Commission remain available for expenditure for five years. This sound procedure should be extended to all Federal agencies which support basic research outside the Federal Government.

PERSONNEL PROBLEMS IN SCIENCE

There is as wide a difference in atmosphere and morale among various laboratories within Government as there is among industrial establishments and universities.

While there are very significant non-monetary factors that bear upon the desirability of scientific work in the Federal Government, salaries are important.

The average compensation of Government scientists is higher than that of scientists in universities, but lower than that of industrial scientists. For younger scientists compensation of Government scientists compares favorably with that of industrial scientists.

Most important, however, is the wide gap between the salaries commanded by outstanding men in industry and in the Federal Government. The general Civil Service pay ceiling is $10,000, whereas outstanding scientists and research directors in industry command much higher salaries. In the face of high industrial salaries, it has been difficult to recruit and retain scientists of the highest caliber. The presence of top quality men in the Federal scientific service is an indication of the non-monetary advantages of Federal scientific work.

Inspiring leadership and competent supervision are perhaps the most important factors in increasing the effectiveness of research effort. The combination of technical, administrative and human qualities making a successful research director are rarely found. Salaries adequate to attract those individuals are an economy.

Aside from salary levels, pay scales can be improved in a number of respects. There should be, in a number of agencies, less emphasis upon the extent of administrative responsibilities as a basis for pay increases.

Many scientists who worked for or with the Federal Government during World War II were disturbed by the fact that scientific research in the War and Navy Departments was supervised by personnel who had little scientific training. They complained of the rotation which shifted leadership at frequent intervals. They were irked by the imposition of military concepts.

These problems are being corrected by the Departments of War and Navy and the Air Forces. Civilian participation in scientific policy decisons and supervision of technical work by technically trained men has been rapidly expanded in practice.

The success of these efforts to date —as indicated for example, by the high esteem in which the Office of Naval Research is held by scientists —leads to the recommendation that civilian participation in formulation of armed forces research and development policy and in supervision of technical work be even more widely extended.

While rotation of armed forces personnel tends to create problems for both civilian scientists and administrators it leads to wider exposure of officers to scientific work, an advantage that cannot be dismissed.

In the past, heads of some research units have participated too little in the formulation of departmental policies. The heads of major research organizations should be a part of cabinet member's top advisory staffs.

Direct technical supervision of scientific research and development should be in the hands of scientists. But the broad policy considerations involved in the operation of large Federal agencies require experience, training and talents that are not usually distinctive of scientists. Between these extremes, there is a level of activity where operating and policy decisions meet, and where it is impossible to say whether a scientist or a non-scientist can do a better job.

A serious problem in some scientific agencies is a restriction on the ability of scientists to communicate with their professional colleagues by publication and by attendance at professional meetings, an inexpensive and effective means of avoiding scientific isolation, which can lead to mediocre work. We therefore recommend that the Congress appropriate larger sums for travel of scientific employees to professional meetings.

One problem encountered in some Federal laboratories is that the bulk of the work is developmental in character, distasteful to many scientists with outstanding ability and imagination. More careful assignment of persons to projects which fit their qualifications is needed in some agencies.

National security dictates that some research and development work be kept secret. Restriction on the freedom of scientists engaged in classified work to discuss and publish their findings contributes to the difficulties encountered in recruiting scientists Nevertheless, concentration of secret research and development work in Governmental laboratories is highly desirable.

As a matter of policy, no secret or confidential research or development projects should be placed with universities in time of peace. Every effort should be made to transfer these projects to Federal establishments.

As a general policy, we recommend *that continuous pressure be exerted to minimize the amount of development, and particularly the amount of basic research, conducted under security restrictions.*

FEDERAL ORGANIZATION FOR SCIENCE

The task of policy formulation for the Federal research and development program requires establishment of a number of coordinating centers within the executive branch of the Government to provide:

1. An over-all picture of the allocations of research and development functions among the Federal agencies, and the relative emphasis placed upon fields of research and development.

2. A central point of liaison among the major research agencies to secure the maximum interchange of information with respect to the content of research and development programs and with respect to administrative techniques.

3. A single point close to the President at which the most significant problems created in the research and development program of the Nation as a whole can be brought into top policy discussions.

Setting up an organization to handle these diverse functions is not a simple task that can be solved, for example, by establishment of a Department of Science. Such an approach was considered in the course of these studies and, after consultation with scientists and administrators, was rejected.

The liquidation of the Office of Research and Development after the end of the war has left a gap. It is unlikely that the organization and procedures of this office would have been as satisfactory for stimulation of research and development over the long run as they were for the attainment of immediate war-time objectives.

Present Mechanism for Formulating Policy

With the demise of OSRD, there are three points in the executive branch where segments of general policies with respect to research and development are formulated—the Bureau of the Budget, the Research and Development Board of the National Military Establishment and the National Academy of Sciences. In addition, of course, the Congress has an over-all responsibility in terms of authorizing programs and appropriating funds.

Since its establishment in 1921 the Bureau of the Budget has participated in the over-all coordination of the entire executive establishment. It is a major staff arm of the President and he depends heavily upon the Bureau; its sanctions are potent. Two of its divisions are of special importance in connection with scientific research and development, the Estimates Division and the Division of Administrative Management.

The Bureau of the Budget is not and should not be charged with the task of developing a scientific research program for the nation. It does not ordinarily perform such a role in respect of any Federal activity.

The Bureau should, however, continue to take the initiative in the allocation of research functions among Executive agencies. Its organization should be strengthened to provide means of taking an over-all view of the research and development programs.

The National Security Act of 1947 established a Research and Development Board with broad responsibilities pertaining to the National Military Establishment.

The tremendous programs conducted by the three branches of the National Military Establishment impose a heavy responsibility upon the Board. Its authority is, however, wider than coordination of programs conducted by the three Departments of the National Military Establishment. It is also directed to advise with regard to trends in research relating to national security and to formulate policies in connection with matters involving outside agencies.

It would not be fair to expect such a Board to coordinate the entire national science program. Nor do we believe that it is sound public policy to coordinate the entire research and development program of the Federal Government through an organization responsible to the Secretary of Defense.

The National Academy of Sciences, founded during the Civil War by Act of Congress, consists of several hundred scientists elected by the membership of the Academy. Its function is advisory only, and it acts only upon request of Departments of the Government or other interested parties. The Academy receives no financial support from the Government, all expenses of its investigations for governmental agencies being met from appropriations to the Departments requesting assistance.

The Academy organized the National Research Council in 1916 and perpetuated it in 1919 in response to Executive Order 2859. The Council, which operates no laboratories, stimulates scientific research, surveys the larger possibilities of science, administers scientific research fellowships financed from private sources, encourages the publication of scientific papers, and promotes research cooperation generally.

Despite the valuable contributions that these bodies have made and will continue to make, they cannot be expected to ensure coordination of the Federal research and development program because they have no organic connection with the Executive Branch of the Federal Government.

The Congress is not so organized that it can take a broad view of the Federal research and development program. In each House of Congress the Appropriations Committee is divided into subcommittees along lines similar to those in the Estimates Division of the Bureau of the Budget. The result, as in the Bureau of the Budget, is lack of any common center for a review of the whole research program, lack of any unified or systematic approach to scientific research problems or policy, and lack of staff technically competent to deal with scientific matters.

Filling Gaps in Policy Formulation

The following steps should be taken:

1. An Interdepartmental Committee for Scientific Research should be created.

2. The Bureau of the Budget should set up a unit for reviewing Federal scientific research and development programs.

***3. The President should designate** a member of the White House staff for scientific liaison.*

The Interdepartmental Committee should consist of those officials of the Government most deeply concerned with scientific research and development, as, for example, the Director of the Geological Survey, the Agricultural Research Administrator, the Director of the Bureau of Standards, the Director of Aeronautical Research (NACA), the Director of the National Institute of Health, the Director of Research of the Atomic Energy Commission, and appropriate representation from the research activities of the National Military Establishment.

The president might also appoint other members with a direct interest in scientific matters—for example, a representative from the Department of State, to advise on matters of international scientific cooperation, one from the Civil Service Commission to advise on questions of scientific personnel in the Government, and the Director of the National Science Foundation.

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NATIONAL SCIENCE FOUNDATION: THE STEELMAN REPORT MISSES THE POINT

Study Group, Washington Association of Scientists

This critical analysis of one phase of the Steelman Report, condensed elsewhere in this issue, was prepared by the same group of scientists in Washington, D. C. whose comparative study of Science Foundation bills appeared in the last BULLETIN. The members of the group were Clifford Grobstein, chairman, John Conly, Irving Feister, Laurence Heilprin, Robert D. Siehler, Francis J. Weiss, and Laurence A. Wood.

Despite many valuable contributions made in the Report of the President's Scientific Research Board, headed by John R. Steelman, the recommendations on the proposed National Science Foundation fall disappointingly short of desired objectives. Since the close of the recent war there has been a widespread acceptance of the importance of establishing a central federal agency whose concern would be with over-all evaluation, coordination, and support of the national science effort. The Steelman Report recommendations, unfortunately, do not add up to such a central agency, but instead suggest diffusion of responsibility for science policy through a number of Federal agencies, some existing, some not beyond the proposal stage.

RECOMMENDATIONS ANALYZED

The Board's recommendations are the more surprising since the need for a central agency is quite clearly indicated by the Report. Having noted (Vol. I, p. 3) that the security, prosperity, and the very survival of the United States depend today upon the rapid extension of scientific knowledge, the Report points out that in spite of this "The United States has no unified or comprehensive policy on scientific research or the support of science." "As a people," it says, "we have not weighed the question of the share of the national income which should go to support science or of the respective roles to be played by industrial, university and governmental research centers in our national science effort." (Vol. 1, p. 9). "The need for a mechanism that will provide perspective for the research and development programs has long been recognized. A variety of efforts has been made to meet this need, but all have been of a fragmentary character."

This is a familiar line of thought to all who have followed the debate on national science policy during the past several years. It led to the original conception of a National Science Foundation, and has been the major premise of those who have sought, so far unsuccessfully, to have such a Foundation established. Nevertheless, the Steelman Report, in spite of its clear reiteration of the basic argument, and its ample justification of it with facts and figures, departs substantially from the consequent conception in its recommendations. Thus, the Report recommends:

1) That the National Science Foundation "be primarily concerned with grants in support of basic research to be conducted by the colleges and universities and with coordination of grants for basic research made by other Federal agencies." Because of its close relation to academic institutions "The most logical administrative location of the Foundation is *with the other Federal units dealing with educational problems.*"

2) That provision for scholarships and fellowships in science be made *as an integral part of an over-all national scholarship and fellowship program.* The importance of science scholarships and fellowships at the present time is minimized, and no relation of such scholarships and fellowships to the National Science Foundation is indicated.

3) That a program of Federal assistance to universities and colleges be developed in the matters of laboratory facilities and scientific equipment *as an integral part of a general program of aid to education.*

4) That a Federal committee be established to assist in the coordination and development of the Government's own research programs.

5) That a special unit be established in the Bureau of the Budget enabling this agency better to handle problems relating to research, and permitting it "to take effective initiative in the allocation of functions in the field of scientific research."

6) That the President have a scientific liaison officer on the White House Staff.

NO SPECIFIC RESPONSIBILITY GIVEN

Whatever may be said of the merits of each of these recommendations individually, it is clear that they do not add up to an organization with specific responsibility for over-all evaluation and policy formation for science in our national life. The proposed National Science Foundation is stripped of all but its function of administering grants-in-aid, thus being made into a new research foundation disbursing public instead of private funds. It is assigned no organic relation with policy-forming governmental agencies; rather it is vaguely placed "with other Federal units dealing with educational problems." The scholarship and fellowship program, having been divorced from the Foundation, is left dangling on the pious hope that it will become part of a hoped for general program.

A commendable recommendation for assistance to colleges and universities in the matter of laboratory assistance and scientific equipment is likewise made dependent upon the development of a general education program. The

remaining recommendations deal specifically with Federal science and represent some progress toward integration of this important part of the national science program.

Even here, however, the organization falls somewhat short of the desired goal, since it carefully limits the proposed Interdepartmental Committee to an advisory role (Vol. III, p. 24) and gives ultimate power to the Bureau of the Budget "to take effective initiative in the allocation of functions in the field of scientific research."

It is difficult to see what persuaded the President's Scientific Research Board to assign a Committee composed of the heads of operating scientific agencies, presumably close to actual research needs, only advisory functions while making a primarily fiscal agency the arbiter of scientific policy.

All of this suggests the conclusion that the Steelman Committee, in spite of the value of its report as an argument for an effective national science policy and the excellence of a number of its conclusions, has completely missed the point as to the nature of the required organization.

The simple fact that has been overlooked is that modern science following the Second World War is *a major social institution in its own right.* It must not be administered as the handmaiden of education, of technology, of public health, of agriculture, or of any of the other major social institutions with which it integrates, or which it in part serves. Its function, for which it has virtually exclusive responsibility, is discovery—discovery of the regularities of nature and of the means of controlling its vagaries, discovery of techniques, and methods for satisfying human material needs, and, it may be hoped eventually, of means and procedures for peaceful social living.

In a world constituted as is the world of today, discovery must be ranked with production, distribution, finance, government, and other salient economic and political functions as a crucial determinant of our future development. The administration of so crucial a factor cannot be left to chance, and it cannot be diffused through the national structure. There must be a central agency whose exclusive concern is with the problems of scientific discovery, and so organized that it can, through democratic procedures, implement its policies. It must have jurisdiction, therefore, over such mechanisms of implementation as scholarships and fellowship programs, grant-in-aid programs, and inter-agency liaison committees. This is not to say that such an agency should direct, in the coercive sense, the national science effort. It is only to say that it must be the central focus of all activities, the recipient of advice and requests from working scientists and from other social activities dependent upon science, and the source of general policy to be implemented in detail by the working organizations.

It is difficult to believe that the President's Scientific Research Board is not aware of this central need for American science, particularly in view of the opening paragraphs of its Report quoted above. It becomes necessary to ask, therefore, whether the present equivocal status of National Science Foundation legislation may not have played a prominent role in the formulation of the Board's recommendations.

It is worth recalling that in the last Congressional session the measure came very close to being a party issue. Administration of the Foundation by a large part-time board was pushed strongly by the Republican leadership. Senator Taft felt so keenly on the matter that when the bill was amended in the Senate to permit the President to nominate the Director, the Senator voted against the entire measure. Later he succeeded in restoring the original draft thus forcing a Presidential veto.

Is it possible that in the Steelman Report the administration is attempting to attain limited objectives through administrative rearrangement, while side-stepping the congressional issue by relegating the Foundation to a relatively minor role? Only the Presidential Board itself can answer this question, but if it is the case it must be strongly pointed out that a compromise such as the Board offers might secure the form but would sacrifice the substance of the objectives of most American scientists as expressed in the Inter-Society Committee Report. The disagreement has been over the administrative structure of the Foundation.

Important as this issue is, it must not be resolved through destruction of the Foundation's fundamental purpose. In the Board's own words, "The United States has yet to develop a unified policy for science." (Vol. III, p. 9). "The United States, almost alone among major powers, has failed to establish an effective means of determining broad scientific policy either on a national or Government-wide basis." (Vol. III, p. 9). "In the present state of the world, this situation cannot be allowed to continue." (Vol. I, p. 9).

Such an imperative cannot be met by compromise of the essential issue. We must have a genuine policy-forming organization for science, not the watered-down National Science Foundation of the Steelman Report.

Science and Public Policy

(Continued from Page 29.)

A channel should be provided through which broad results of the Federal research and development program as a whole can be brought to the top policy councils of the Government. That is a primary reason for suggesting that the President designate a member of the White House staff for scientific liaison. He would sit with the Interdepartmental Committee and might well, at the discretion of the President, serve as its Executive Secretary. He might well attend meetings of the National Science Foundation when established.

The problems with which these reports are concerned are urgent, but they are only parts of much larger problems involved in the continued extension of knowledge in all fields, in the elevation of the educational level of all of our people, in the continued expansion of our economy and the continued strengthening of our democratic institutions. They can be singled out for attention, as they have been here. But they cannot be solved in isolation. Science cannot flourish if our educational structure is enfeebled or if progress is retarded in other areas.

In the long run it cannot flourish in the midst of a troubled armed truce. For the history of science is a monument to the importance of those cherished freedoms of expression and association which are the cornerstones of democracy; and the international community of scientists is a harbinger of a day when common interests may bring all peoples into closer cooperation.

ASSOCIATION OF SCIENTISTS FOR ATOMIC EDUCATION NEWS

The September and October meetings of the Board of Directors of the ASAE have shown a majority to be in favor of the organization's recognizing and cooperating to some extent with the efforts of world government groups and studying the proposals of individuals which aim at the elimination of war as the best, if not the only, hope for survival.

For some time, it has been generally realized by scientists engaged in educational activity that the "One-Two-Three" approach, i.e., 1, no secret; 2, no defense; 3, therefore international control, which represents the fundamental agreement among all scientists in educational work, is no longer sufficient. They feel that it is time for scientists to offer conclusions for dealing with the overall problem of world security. The original three point educational approach is even being regarded now by some as highly dangerous and directly responsible for the irrational demands for a preventive war which are becoming more bold in the face of stalemate in international control negotiations.

The desire for a broader policy first found concrete expression when a representative group of scientists and non-scientist advisers met at Lake Geneva, Wisconsin, last June, and issued a statement[1] which recognized that the problem of atomic energy "cannot be dissociated from general progress toward cooperation among nations." They agreed that the real "purpose—which is the permanent elimination of war—requires the establishment of a government of the world with powers adequate to maintain a peace based on the rule of law."

The June 30th statement of the Emergency Committee of Atomic Scientists[1] also called for a "supranational government with powers adequate to the responsibility of maintaining peace."

The recent meetings of the ASAE Directors were dominated by discussions of the extent to which this organization could wisely support these two statements of policy. At the September meeting, Cord Meyer, Jr., President of the United World Federalists, gave a highly informative address describing its policy. He offered four proposals for cooperative action with ASAE. As a result, a resolution was passed in which the Board recognized that it is within the province of the Regional Councils to make such working agreements with other organizations in the field of public education as they may see fit, provided that actions which commit, or appear to commit, the ASAE to support of the specific program of such organizations shall not be taken except through action of the National Board of Directors.

At the October meeting, much discussion centered on the possibility of reaching a unified policy toward the solution of world security problems, which might become a fourth point in the educational program. It was finally decided that such agreement was impossible at the moment. However, the ASAE took as its primary obligation for the next three months the organization of discussion, among all interested scientific and other groups, of the proposals listed below; it is hoped that resolutions on a number of these proposals will be prepared and circulated among the various Regions through the National Office[2] within the next three months.

1. Szilard's "Calling for a Crusade"[3]
2. Urey's "Alternate Course for Control of Atomic Energy"[4]
3. Henry Usborne's "Plan for a Popular Convention to Frame a Constitution for a Federal World Government."[5]
4. "The Montreux Declaration on World Government.[6] (It is suggested that 2, 3 & 4 be discussed together, along with the Culbertson and United World Federalist Approach under the general heading of World Government.)
5. The Squires and Daniel, and Cavers proposals for a moratorium on atomic power production.[7]
6. The Gromyko proposal on atomic control.[8]
7. The Marshall Plan (European Recovery Program).

Sally Hammond Trope

1. BULLETIN, Vol. 3, No. 8.
2. Association of Scientists for Atomic Education, Room 523, 625 Madison Ave., New York 22, N. Y.
3. BULLETIN, Vol. 3, Nos. 4-5
4. BULLETIN, Vol. 3, No. 6
5. BULLETIN, Vol. 3, No. 12
6. *World Government News*, Sept., 47
7. BULLETIN, Vol. 3, Nos. 4-5, 10.
8. BULLETIN, Vol. 2, Nos. 1-2; Vol. 3, No. 8

PRINCETON CONFERENCE OF ATOMIC SCIENTISTS

A conference in which about 40 scientists and a few social scientists participated was held in Princeton, New Jersey, on November 28-30, upon the initiative of the Emergency Committee of Atomic Scientists. The subjects discussed included the attitudes of scientists, and their organizations, towards the movement for World Government, the European Recovery Program, the United Nations negotiations on international control of atomic energy, and the domestic atomic energy situation. Informal polls were taken to clarify the prevailing opinions. The conference was not intended to take formal decisions or issue statements, but rather to provide an exchange of opinions which may help to orient the future activities of the Emergency Committee, the Federation of American Scientists (FAS), and the Association of Scientists for Atomic Education (ASAE). Its conclusions will undoubtedly be further discussed in the individual organizations.

FIFTH ANNIVERSARY OF THE PILE

The success of the first self-sustaining nuclear chain reaction was commemorated on December 2 by the dedication of a plaque on the West Stands of Stagg Field on the University of Chicago Campus where the experiments with the first pile were carried out five years ago. The plaque reads:

On December 2, 1942
Man Achieved Here
The First Self-Sustaining Chain Reaction
And Thereby Initiated the Controlled Release of Nuclear Energy

Speakers at the ceremony included Enrico Fermi, designer of the pile, Farrington Daniels, chairman of the Board of Governors of the Argonne National Laboratory, Robert F. Bacher, of the A. E. C., Walter H. Zinn, director of the Argonne Laboratory and Chancellor Robert M. Hutchins. A luncheon in honor of scientists who had assisted in the experiments was given by the Citizens Board of the University of Chicago before the ceremony.